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ABSTRACT

This study provides an extensive review of the literature on distance education and of representative distance education projects and institutions in the United States and abroad, emphasizing those using telecommunications technologies. The introductory section includes a sketch of the information age and its implications for adult education and outlines the scope of the paper. The second section explains the current boom in new delivery systems, defines distance education and the distance learner, and describes how new technologies are changing the shape of correspondence study. The next section recounts the history of educational broadcasting and of public television and radio in the United States. Then, the emergence of productive collaboration between public broadcasters and educational agencies is discussed, as well as the instructional design process for telecourses, multimedia instruction, and telecommunications consortia. In the next section, distance education is characterized as an international movement, with special attention to the development and influence of the British Open University. Also discussed are methods for maintaining quality in distance education. Another section reviews research on distance learning systems and instructional effectiveness of nonprint media. Concluding sections of the monograph provide a look at the future, a glossary of terms on telecommunications technologies, a list of references, and a selected bibliography. (SK)

DISTANCE EDUCATION: AN INFORMATION AGE APPROACH TO ADULT EDUCATION

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FOREWORD

The Educational Resources Information Center Clearinghouse on Adult, Career, and Vocational Education (ERIC/ACVE) is one of 16 clearinghouses in a nationwide information system that is funded by the National Institute of Education. One of the functions of the Clearinghouse is to interpret the literature that is entered into the ERIC database. This paper is of particular interest to adult education practitioners and vocational educators who provide training for adult workers.

The profession is indebted to James Zigerell for his schclarship in the preparation of the paper. Currently, Dr. Zigerell is Staff Director of the Instructional Telecommunications Consortium of the American Association of Community and Junior Colleges, Washington, D.C., and serves as a consultant on instructional telecommunications to colleges and publishers. Until 1978, he was a Professor of English and Humanities and an administrator in the City Colleges of Chicago where he served as Dean of the Chicago TV College and an Assistant Vice-Chancellor in charge of instruction and faculty development. He has written extensively on instructional technology in postsecondary education.

The author would like to acknowledge the kind assistance of Dr. Keith Harry, British Open University International Documentation Centre on Open Learning. Recognition is also due to Martha Stroud, Assistant to the Academic Vice-President, University of Calgary; Thomas C. Wilson, Director, The Open University, University of South Florida; and Ida Halasz and Carl Oldsen, Research Specialists, the National Center for Research in Vocational Education, for their critical review of the manuscript prior to its final revision and publication. Susan Imel, Assistant Director at the ERIC Clearinghouse on Adult, Career, and Vocational Education, coordinated the publication's development. She was assisted by Sandra Kerka and Shelley Grieve. Jean Messick and Linda Adams typed the manuscript and Janet Ray served as word processor operator. Editing was performed by Judy Balogh of the National Center's Editorial Services.

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EXECUTIVE SUMMARY

This study provides an extensive review of the literature on distance education and an examination of representative distance education projects and institutions in the United States and abroad, emphasizing those using telecommunications technologies. The introductory section includes a sketch of the information age and its implications for adult education and outlines the scope of the paper. The second section explains the current boom in new delivery systems, defines distance education and the distance learner, and describes how new technologies are changing the shape of correspondence study. The third section recounts the history of educational broadcasting and of public television and radio in the United States. Then, the emergence of productive collaboration between public broadcasters and education agencies is discussed, as well as the instructional design process for telecourses, multimedia instruction, and telecommunications consortia. In the next section, distance education is characterized as an international movement, with special attention to the development and influence of the British Open University. Also discussed are methods for maintaining quality in distance education. Another section reviews research on distance learning systems and instructional effectiveness of nonprint media. Concluding sections of the monograph provide a look at the future, a glossary of terms on telecommunications technologies, a list of references, and a selected bibliography.

Information on distance education may be found in the ERIC system under the following descriptors: Adult Education; Broadcast Industry; Cable Television; Communications Satellites; Community Colleges; Consortia; Correspondence Study; *Distance Education; Educational Radio; Educational Technology; *Educational Television; Instructional Design; *Multimedia Instruction; Nontraditional Education; *Open Universities; Postsecondary Education; Public Television; Student Characteristics; *Telecommunications; *Telecourses; Universities. (Asterisks indicate descriptors having particular relevance.)

INTRODUCTION

The Information Age and Adult Education

By now, the use of John Naisbitt's (1982) term "information age" to describe the time in which we live has become trite. Everyone agrees with Alvin Toffler (1980) who has reminded us that "an information bomb is exploding in our midst" (p. 172). The mass media, television in particular, have changed our lives. We have now entered a new phase of the communications revolution, with media becoming ever more specialized. They are designed for smaller and smaller audiences, whether members of the audience touch keypads of personal computers or watch recorded video programs in their homes, in community centers, or at work sites.

In addition, electronic media--which so many people consider mechanical and depersonalizing--now promise to individualize the exchange of information and instruction for people who cannot interact with teachers or others on a person-to-person basis. For example, residents of a community in Japan that is a part of the Hi-Ovis fiber optical communications system, which is both video and audio interactive, can talk back to and be seen by the hosts of a local news roundup. Residents can also call up videotapes on topics ranging from child care to the art of flower arrangement. Several channels of the 40 in the Hi-Ovis system provide programs requested by individual viewers (Zigerell 1983-1984). This service, which its underwriter, the Japanese Ministry of Telecommunications, terms "the communications system of the next century" (p. 42), has the potential for creating an electronic community in the dormitory suburb in which it is located.

Not surprisingly, adult educators, particularly those interested in serving people studying at a distance, are intrigued by the instructional and individualizing possibilities of the microcomputer, one of the most exciting media of the new phase. By means of an inexpensive modem, one microcomputer can interact with another via the telephone. Norwood (1982) summed up the implications of this development as follows: "Couple the home computer with the telephone as well as with television, and a vast storehouse of information is unlocked" (p. 21).

The implications of this explosion of information and information technologies are profound for adult educators. The information age portends not only an expansion and transformation of the field of adult education, but also a broadening of the role of adult educators themselves. One result is even stronger impetus for them to develop programs for the adult who must, or chooses to, study at a distance.

Telecommunications media are fast leveling what were formerly insuperable barriers to adult participation in organized study programs: space and time.

Studies of adults enrolled in open and distance learning projects all over the world consistently disclose that most feel distance, time, age, expense, and fatigue are major obstacles to participation in conventional study programs (Jammer and Shale 1981). Constraints on working adults interested in work-oriented study have always been particularly heavy. But, the new communications technologies are already removing some of these long-standing barriers for would-be learners. For instance, workers in Wisconsin and California can now study the fundamentals of electrical circuitry by enrolling in a self-paced, computer-managed video course offered on a work site. They report to a special study carrel, watch video segments, and interact with the computer--all at their own pace (Mirkin 1982). These materials and the instructional method, designed by the Wisconsin Foundation for Vocational, Technical, and Adult Education and the College of San Mateo, are good examples of how instruction delivered via media can overcome both the physical and psychological blocks to learning experienced by adults.

The Outlook and Challenge for Adult Education

The Rise of Distance Education

At the present time, by "networking" video, telephone and interactive audio, and computers, educators can design systems that deliver education and training to adults at a distance while simultaneously meeting individual needs. There is a promise of unlimited access to educational and training opportunities for all adults, whether they are in search of basic literacy and coping skills, personal enrichment, occupational improvement, or formal higher education. Future uses of communications technologies in the education of adults will hinge on the suitability of materials for targeted learners and the knowledge adult educators acquire about how adults studying at a distance learn.

If the dizzying variety of communications media now available make it possible for adult educators to widen the scope of their activities, the changes that have so profoundly reshaped post-World War II societies are forcing them to do so. A growing egalitarianism has created demands for more educational opportunities for all adults, no matter what their situation. The "open" academies and universities that have sprung up in the wake of the British Open University illustrate dramatically the demand for formal education, both from those denied it in their youth and from those who, having been unsuccessful in early attempts, are looking for a second chance in maturity.

Adult education and training are now matters of concern for agencies other than schools and colleges. The accelerating shift from an industrial society to one tied to high technology and the service area of the economy is leaving many adults with obsolete occupational skills or skills no longer in great demand. Therefore, the private sector invests a large amount of time and money in upgrading and retraining workers outside normal school settings.

Never before have there been so many challenges for the adult educator--or so many truly innovative ways to meet the challenge.

Present and Future Demands

Walter Perry (1978), the first vice-chancellor of the British Open University (BOU), which allows adults to earn degrees by studying at a distance, is well qualified to discuss the causes for the rapid growth of the phenomenon in adult education known as distance learning. Foremost among the causes, he asserts, is deep-seated dissatisfaction (primarily outside the United States) with the traditional higher education structure, which is steeped in elitism and favors only the young and the privileged. This discontent is being exacerbated by the technological revolution and the information technologies in particular. People in all walks of life are now aware of global problems. They see education as a way to cope with prohlems, and they claim their right to participate in the educational system.

Many people feel that education can help them make better lives for themselves, both economically and otherwise. Data collected by the National Home Study Council (Lambert 1983), for example, show that adults in large numbers act on this belief. The 400 private home study schools now in operation offer courses in about 600 areas, most of which have a career or vocational orientation--with electronics, business, and computers being the most popular.

Egalitarianism, demographic, and economic factors are all prompting long overdue changes in the educational system to ensure that learning opportunities are lifelong. The pressure for such change is also being felt in the United States, even though postsecondary education is much more accessible to the mass of the people here than elsewhere.

In this country, however, there is a lessening demand for the kinds of instructional programs colleges have been offering since colonial times to students aged 18 to 22. In the words of experts in higher education management, there is "growing evidence that American higher education may be overbuilt in relation to the number of students seeking programs that the colleges historically have offered" (Carruthers and Lott 1981, p. 31). As a result, there is a strong interest in new programs for new kinds of students. It is only reasonable to expect that more occupationally oriented and leisure-time programs, both technologically and conventionally delivered, will be designed for adults studying at a distance from campuses and teachers.

Distance education in the next century. In 1981, the Green Chair Group of the National Home Study Council asked 25 home study educators, educational technologists, and informed laymen from government, industry, and trade associations to look beyond the turn of the century and predict what distance education would generally be like and how strong the demand for it will be (Green Chair Group 1982). The resulting lengthy report touches on demographics, enrollment procedures, materials, delivery and student support services, and applications of distance learning services.

In general, participants agreed that distance education will become more complex as a consequence of the increase in life expectancy and the frequency of career and job changes. Thus, demands for credentialing and continuing professional/occupational education will be strong, with employers bearing the cost. Finally, though the panelists stressed that in 2001 learners will still

want live teachers, they conceded that the rising costs of on-campus instruction will make distance learning popular even with some who have access to traditional classroom instruction.

Other predictions of the group are specific and highly relevant to this study. The age of distance learners will range from 18 to 70, with a tilt toward the higher end as life expectancy rises throughout the next century. As midlife career changes become the norm rather than the exception, distance learners will want more occupational and job-related programs. The largest proportion will be enrolled, in fact, because they believe that education is the path to a richer life. Greater longevity, the group forecasts, will also bring with it more demand for informal courses and short courses in leisure-time and cultural activities.

This demand by adults for greater educational opportunity will be a continuation of a trend that began with the end of World War II, when hundreds of thousands of returning veterans were able to participate in training and education through the G.I. bill. The call will grow even more insistent as the century ends. Of necessity, adult educators will turn to distance education, in both technological and conventional formats.

Walter Perry (1978) once summarized why the notion of continuing education has become so prevalent throughout the entire world during the past several decades. His statement, an eloquent and persuasive one, deserves quotation as it documents the need for a better understanding and appreciation of distance education.

> The rate of acquisition of new knowledge is now so fast--and it is still accelerating--that the idea that a man, during his initial education, can be so fully educated that he can cope successfully with his chosen career throughout his working life is no longer tenable. The rate at which jobs become obsolescent because of new technological developments is now such that an increasing proportion of adults have to change from their chosen careers to new ones. . . . There has been a growing realization of the fact that a selective system of initial education takes no account of the late developer, who may awaken to a realization of the importance of education all too late for the system. In an age where there is an increasing availability of leisure time, the problems of satisfactorily filling the leisure time take on a new importance, and the most satisfying of all leisure activities is, for many intelligent people, the pursuit of knowledge and new interests. A system based almost entirely upon initial education makes little provision for them. (pp. 281-82)

Purpose and Scope of Study

Distance education for adults is now regarded in some quarters as a "boom" industry (Moore 1981). It becomes important, therefore, that all adult educators, as well as everyone interested in adult and lifelong learning, know something about it--its development, its goals, and the shapes it has taken.

The purpose of this study is to provide such a background by reviewing a representative sample of the literature on distance education (which is extensive but often not readily accessible), and by looking at selected examples of distance education projects and institutions in this country and abroad. Emphasis will be on those distance education projects that employ telecommunications technologies.

Sections that follow deal with the historical background of distance education and its theoretical foundation, as well as the ways it is delivered to adults. Special attention is given to the reciprocal relationship between the mass media and recent communications technologies and the shape and delivery of instruction.

Chapter five presents distance education as an international movement in adult education, inspired in large part by the truly spectacular success of the British Open University: an autonomous, degree-granting institution employing a distinctive multimedia system to teach adults at a distance. Chapter six contains an overview of the kinds of research conducted on distance education systems and distance learning, as well as on the instructional effectiveness and uses of the nonprint media--video and audio--that are now familiar elements of teaching.

A monograph could be written on the topic of each section. Some readers, however, may feel that too much is said about some topics, and too little about others. Some, for example, may become impatient with the discussion of the telecommunications technologies themselves. In defense of this, it should be noted that the "hardware" not only helps shape the process, but also enables distance educators to target both wider and more specialized audiences. Thus, to appreciate the potential of contemporary distance education, the reader must have some notion of the media now available to deliver the instruction and support students as they study. A glossary of terms is appended for those unacquainted with the newer technologies.

Other readers, perhaps, might welcome more information about specific projects or may feel that too much attention is given over to the British Open University or to United States telecourses as distance education systems. But if a study is not to make unreasonable demands on a reader's time, it must be selective, trusting that the projects and institutions touched upon are representative and reflect common distance education goals. The British Open University itself is a model that has been adopted and adapted all over the world. Indeed, it is the one institution whose astounding success has furthered distance education as an international movement in the Western, Socialist, and Third Worlds. The video-based telecourse is, to date, this country's most distinctive contribution to adult distance education. The reader desiring greater depth should consult the list of references and the selected bibliography included at the end.

Providing background for a movement that has added new dimensions and new clients for adult education is the primary goal of this study. Yet, wherever appropriate, lessons as to what seems to be effective in distance education--and why--will be derived, drawn on the basis of the experiences discussed.

Readers who are, or may become, involved in planning or coordinating distance education projects may find this of value.

A word, too, should be said about occasional shifts in terminology that may unsettle a reader--from distance education to distance learning. When the process itself is in question, the term distance education is used. If focus is on the receiving end of the process, distance learning is used.

NEW WAYS TO SATISFY BOTH OLD AND NEW DEMANDS

Factors Furthering the Development of Distance Education

The Mass Media

Television and radio--even the newspaper--have become appealing vehicles of instruction for adult educators and agencies determined to respond to the demands for lifelong education. These media can be employed on a mass scale and can make education and training inexpensive enough to be placed within the reach of working men and women, no matter how far they may be from the source of instruction. Furthermore, these media conquer space and time, previously noted as the prime barriers to education for adults. As Perry (1977) points out, there has been a historically fortuitous convergence of a public demand for a product--education--and the means--the media--by which the product can be taken directly to consumers at their convenience.

Social Factors

Although dissatisfaction and social unrest are forceful motivational factors in distance learning projects, they find differing expression in different societies. In the developed nations, the demand is often for formal higher education for those denied it early in life. In developing nations, on the other hand, distance learning institutions are often established to serve the young for whom there are not sufficient places in traditional colleges and universities. This is the case in populous areas like India or Latin America.

Sometimes, however, social pressures come from both sides. One of the latest of the distance universities, Japan's University of the Air (UA), was inspired in part by student dissatisfaction and in part by the older adult demand for further educational opportunity (Sakamoto and Fujita 1980). One of Japan's most pressing educational problems is providing enough places in universities for its bulging 18- and 19-year-old population. Although the UA is designed "to provide university-level education for workers and housewives" (University of the Air Foundation 1982, p. 1), when it opens in 1985 it will also serve as an alternative to the traditional universities for many younger adults. Thus, as in the underdeveloped nations, a distance university will give young people their first chance.

Credentialing Demands

The adult demand for university-level education is one factor in the current distance learning picture. It has set off a kind of chain reaction in that new opportunities for formal higher education have triggered demands for

alternative ways to achieve academic credentialing, such as credit for life experience. Indeed, studies show that to a large extent the desire for credentials is the driving force behind open and distance learning projects. The more academic credit distance and nontraditional learners have, the more they want. Even when learning is informal, the learners still welcome recognition (Pike, McIntosh, and Dahllof 1978).

This desire for credentialing, especially in the Western societies where formal credentials open doors to success, is simply another sign of the need for lifelong learning on purely utilitarian grounds. Adult educators are in agreement with the Green Chair Group that an aging population will want more education, both formal and informal, that furthers career change, improves family and personal life, and enriches leisure time (Waniewicz 1982).

Versatility of Distance Education

Thus far, distance learning projects have proved to be remarkably versatile, particularly when instruction is delivered via the broadcast media, or by closed-circuit technologies now readily available, such as videocassettes, cable TV, or Instructional Television Fixed Service (ITFS). Adults now have access to programs ranging from adult basic education to advanced professional continuing education by way of these broadcast and nonbroadcast media.

As long ago as the 1960s, educators and public officials recognized that the broadcast media, television in particular, were effective means of attacking social and educational problems. A Unesco study, The New Media: Memo to Educational Planners (Schramm and others 1967), identified four needs that could be served by Instructional TV. Of the four needs, three relate directly to the mission of the adult educator; the fourth has to do with enriching and improving instruction in the classroom. Those of immediate concern to adult educators are (1) the need to teach those who are or will be the teachers of the young, (2) the need to increase the literacy and the skills of those living in urban technological societies, and (3) the need to provide extramural extensions of the school and college. Expand the first to include helping people renew job, career, and professional skills, and the needs are up-to-date and still urgent. They are, and will continue to be, needs that distance education projects using distance technologies can serve well. Companion volumes (see Schramm 1967) in the series presented case studies exemplifying how these needs could be met.

A Response to Needs and a Catalyst of Change

Distance education for adults has been undergoing remarkable growth in the past 15 years because it has proved to be a relatively inexpensive way to respond to pressures occasioned by desires for individual fulfillment and by social unrest. Dazzling developments in the communications technologies have leveled what for so long were formidable obstacles for would-be learners: space and time. Given a sizable learner base, print and electronic media can serve as affordable surrogates for the costly buildings and campuses of traditional institutions.

Furthermore, adult educators and public officials recognize that distance learning systems are catalysts of change in all segments of education. The Japanese educators planning the TV and radio-based University of the Air envision the new institution bringing about needed changes in the nation's higher education system, such as "promoting the exchange of teaching staff and the interchangeable credit system between existing universities" (University of the Air Foundation 1982, p. 1). The Netherlands Open University planners regard the introduction of teaching innovations as equal in importance to greater access to higher education and reduced costs in providing it (deMoor 1982). Indeed, university-level distance education projects, with their open admissions policies, remove what for many in the past was an insurmountable hurdle--inadequate or disappointing early schooling.

Theories of Distance Learning

Defining Distance Education in the United States and Abroad

Overall, the distance education story in this country appears to be a patchwork, a matter of trial and error without any theoretical foundation. Until quite recently U.S. educators preferred such terms as open, independent, or nontraditional to describe distance learning. Unfortunately, too, many of the distance education projects that were established proved to be ill-conceived and improvised.

Distance education, termed a kind of "back door" learning by Wedemeyer (1983), is nothing new in the United States. In its contemporary manifestations, it is "learning undertaken in a transactional relationship with educational programs and institutions, but entered into by the choice of the learner on the basis of his own needs, concerns, and aspiration" (ibid., p. 129). The basis is a contract between adult learner and institution. Thus, adults enrolled in New York State's Empire State College can complete degrees by combining individualized study, credit awarded for prior learning, and credit earned through learning contracts negotiated between student and tutor (Worth 1982). The proposed American Open University, an outgrowth of the short-lived University of Mid-America (UMA), planned to operate in a similar way by acting as a broker of prior-earned credit and relevant life and career experiences, awarding credit by examination, and presenting a variety of nontraditional instructional opportunities, some technology based (University of Mid-America 1981).

In 1974-1975, when interest in nontraditional learning was at its height, there were about 100 nontraditional institutions in the United States (National Association of Educational Broadcasters 1974). Indeed, many of the States commissioned feasibility studies for, or actually established, open universities. The above-mentioned Empire State College, the nontraditional branch of the State University of New York, is one of the few that took root.

Unlike American adult and distance educators who tend to take a pragmatic approach, Europeans, especially those on the Continent, have given a good deal of attention to the theoretical bases of distance learning. A recent collection of articles entitled Distance Education: International Perspectives

(Sewart, Keegan, and Holmberg 1983) devotes almost 100 pages to exploring the concept and theory. One of the editors, Börje Holmberg of West Germany's Fernuniversitat, distinguishes two views of the subject. The first perceives distance education as a distinctive educational form based on individualized study; the other perceives it as a parallel to conventional study that, as a rule, must contain an element of face-to-face teaching (Holmberg 1983, p. 4). The British Open University (BOU), which will be examined later in this study, is the model par excellence of the first approach. U.S. projects, for the most part, are examples of the latter since they do not differ from conventional education in any real structural sense but are distinctive only in that they employ nonconventional delivery systems.

The most radical of the distance education theorists is the German Otto Peters, who argues that this new kind of education is based on entirely new pedagogic principles. Essential to its structure is "industrialization"; that is, division of labor in the preparation, mechanization of distribution, and mass production of materials (Keegan 1983, pp. 6-30).

There is no need to dwell further on questions of theory except to note that distance education has become so significant a movement that considerable effort is now being given to articulating its theoretical foundations. This study concerns itself with applications and models. As a British distance educator remarks, "Distance education has managed do very well without any theory" (Perraton 1983, p. 34). Certainly, with the exception of the now-defunct University of Mid-America, U.S. planners have shown little interest in theory as such.

In America, as already suggested, distance education has been regarded simply as an advance in adult education. As one prominent adult educator states, it is adult education "with the traditional forms supplemented by telephone hookups, recordings, courses by newspaper" (Harrington 1980, p. 9). Certainly it is the most exciting development within the world of adult education today.

Distance Education as a Process

Yet, it is productive to ask, what is distance education as a process, and for whom is it intended? Part of the answer, of course, is supplied by the name itself. What characterizes distance education is a physical separation of teacher from student, except for the occasional face-to-face meeting allowed for by some projects. In France, in fact, distance education is defined by law as an educational situation that does not presuppose the presence of a teacher or where a teacher is physically present only occasionally (Keegan 1983).

This kind of definition, however, hardly distinguishes a new and distinctive instructional approach from old-fashioned correspondence study, wherein instructor and student are connected only by the postal service. Desmond Keegan (1983), however, head of an Australian Open College, steers a middle course between U.S. pragmatism and German abstract theorizing when he characterizes distance learning. He points to the following characteristics: the

use of media, individualized teaching, and extensive employment of "industrial" elements such as the postal service and warehouses.

The key ingredient still remains the separation of teacher and learner. Distance education projects that have as a goal imparting knowledge or skills in a systematic way rest on an indispensable core of correspondence study, since print is the basic medium of instruction. Although extensive employment of the electronic media may mark recent distance learning systems, existing projects range from those that rely exclusively on study materials mailed to students (or in areas where the postal service is inadequate, dropped off in central locations), to projects where the learners are supported and counseled via electronic media.

Centrality of Print

A so-called text or print "package" is central to every distance education project, no matter how it is otherwise mediated. Although the video or audio telecourse, employed extensively by U.S. community colleges for off-campus and remote teaching, has a large broadcast component--typically 24 to 30 half-hour programs in a 3-credit-hour course--"the study guide is essential to student success in getting the most from all components of the telecourse" (Mittelstet 1979, p. 53).

Course study guides do everything from presenting course content to leading the distance learner through the course step-by-step. Some distance education systems revolve around elaborate packages of print materials. British Open University course materials, designed by teams of specialists, have become well-known models. Telecourses designed by the University of Mid-America and major community college producers and distributors, including Miami-Dade, Dallas County, Coastline, and the Southern California Consortium, all contain glossy and carefully planned study guides, at times printed by the publishers of the textbooks prescribed for the course.

One observer even expresses concern that such packages may become self-defeating. They can dominate "systems of teaching at a distance to the exclusion of all other activities," and preclude a "student-based approach," which involves "a more rigorous examination of learning at a distance" (Sewart 1983, p. 48). He feels that these highly organized and artfully laid out packages subordinate the distance learner's individual needs to the materials. As a result, learners must adjust their needs to the package, just as their counterparts in the conventional classroom must accommodate themselves to the pace set by the teacher and the class.

Effective study guides, however, avoid this pitfall. They center on the learner and the process of learning at a distance. They reflect what one researcher calls "guided didactic conversation." Whenever the materials have a warm, conversational tone and avoid the impersonality of the textbook presentation, help the student to circumvent common traps, and encourage emotional involvement, then the following observation is valid:

> The distance-study course and the non-contiguous communications typical of distance education are seen as instruments of a conversation-like interaction between the student on one hand and the tutor counsellor of the support organisation administering the study on the other. (Holmberg 1983, p. 115)

Reciprocal Relationship between Media and Distance Education

It is important to note that a reciprocal relationship exists between the newer communications media and distance education. For instance, the desire to extend education and training to people at great distances has sparked interest in and furthered the development of one of the newest communications technologies, the broadcast satellite. In 1980, for example, the Canadian government committed itself to satellite-delivered television as a way of bringing health education and other kinds of formal and informal instruction to citizens in inaccessible areas of a vast country (Potter 1981).

As the media for spreading information multiply, reactions are set off in adult education circles. For example, recognition of the potential of the computer for interactive instruction has prompted educators, businesspeople, and corporate trainers to find ways to bring computer-assisted instruction to people at a distance. Satellites and telephone lines stand ready to deliver the signals to remote learners. Using the satellite, it is no more difficult for the trainer in Los Angeles to deliver training using this technology to field workers in Saudi Arabia or Indonesia than in Appalachia or Alaska (Eldridge 1982).

The Distance Learner

The second of the questions raised previously still remains: for whom is distance teaching, or distance education, intended? Potentially, it is for anyone. In certain parts of the world, there are both children and adults who live too far from educational institutions to be able to attend them. Or if schools are accessible, they are substandard. There are, also, young adults--in Japan, Germany, the Netherlands--who are targets of distance education projects because there are not enough places in the conventional universities to absorb them.

The focus in this study, however, is on the adult learner from age 17 to 70. Within the adult population overall, a review of the literature discloses that distance learners are of four types: (1) men and women who are employed full-time, (2) housewives, (3) those who are confined to institutions, and (4) those whose occupations require them to work at times that preclude their attending classes on normal school schedules (Keegan 1983). There are, of course, subgroups worthy of attention within these general types. The British Open University, for example, has always attracted sizable numbers of teachers who are certified but who do not have university degrees (McIntosh, Calder, and Swift 1977; Perry 1977).

One thing more must be noted about distance learners: their heterogeneity from the standpoint of academic background and proficiencies. This is a natural result of the open admissions policies that characterize distance education institutions.

Distance Education and the Communications Technologies

As has already been noted, it is fortuitous that the proliferation of the communications technologies should coincide with increased adult demand for education and training. Radical changes in national economies and social structures should have created a host of lifelong learning needs for men and women who, had they lived out their adult lives before World War II, might have had no interest in education or vocational training after finishing their initial schooling.

Available Technologies

Several recent studies survey presently available communications technologies and their potential for distance education. Worthy of note is one by Singer and others (1982). An even more recent publication (Feasley 1983) lists and describes in lay terms the media now employed in distance education projects. Besides print and the devices found in almost every U.S. home--telephones, radio, television--the list includes lesser-known technologies:

- o Teletext that permits TV viewers to call up on their home screen printed pages of information from a store of such pages
- o Videodiscs that allow freezing images, slow motion, and self-testing and other kinds of interaction
- o Sideband FM transmission that enables physicians to receive medical education programs and the blind to listen to readings of books and magazines on radios equipped with special decoders
- o ITFS (Instructional Television Fixed Service) transmission, which employs a band of ultra-high frequencies to deliver education to sites equipped with the inexpensive equipment needed to receive the signals.

Some of these newer technologies, as this brief survey suggests, "piggyback," so to speak, on TV transmission. Teletext and videotex (the former one-way, the latter two-way) are digital signals sent during the vertical intervals that separate one image from the next. With a special decoder, a home viewer reads the text on the TV screen.

The computer, too, is finding extensive employment in distance education projects, both in computer-assisted instruction (CAI) and in computer-managed instruction (CMI). Feasley (1983), in fact, singles out the distance-teaching potential of the present generation of personal and microcomputers for special mention. Since the appearance of his monograph only a short time ago, there have been exciting applications of this technology, as will be noted later.

New Shapes for Correspondence Instruction

Print Study Materials

As has been stressed several times, print is still the primary medium for instruction, and in all likelihood it will continue to be so. Correspondence study has been with us for a long time. Indeed, as already stated, one can argue that any distance education project, no matter how extensively committed to the electronic media, is correspondence education at heart. The Green Chair Group (1982) predicted that the year 2001 would still see print as the key component in distance education, with audiovisual devices used widely as supplements. There are no signs at present that print--whether it appears on the pages of a book, a computer, or TV screen--will be displaced as the medium whereby materials in the cognitive domain will be delivered in linear sequence.

Old-fashioned correspondence study continues to flourish as well. The 1983 edition of The Macmillan Guide to Correspondence Study lists thousands of courses in 550 subjects available from more than 100 colleges and universities and 60 proprietary institutions. Entries (which include only those courses designed by schools accredited by the National Home Study Council or accredited colleges and universities) range from job-oriented courses like Automotive Technology to Fortran and French. Schools other than accredited institutions also offer courses.

Statistics concerning correspondence school study are impressive and suggestive. Data gathered by the National Home Study Council (Lambert 1983), for example, show 400 private home study schools enrolling 3 million students in about 600 areas of study. Four out of five home study institutions are proprietary; most offer courses that attract men aged 28 to 34; most courses have a vocational or career orientation; about 50 percent of those who enroll complete the lessons of a course.

The U.S. Government, as it happens, is the largest supplier of correspondence study. Over 2 million people affiliated with the Federal Government (including active duty and reserve military personnel, civil service employees, military dependents, and personnel from allied nations) are enrolled. The Extension Course Institute of the Air University alone enrolls 275,000 students every year in about 400 career development and specialized courses (ECI 1984 Guide). Many of those who complete these courses transfer credit to colleges and universities; others transfer credit to the Community College of the Air Force, a distance education institution in its own right.

Traditional correspondence courses (or home study, as its providers prefer to call it) are most pertinent to this study when the conventional printed lessons are supplemented by mass media-based or other kinds of student support services--newspapers, telephone conferences, face-to-face meetings, seminars, and so forth. As will become clear in later sections, modern distance education, as opposed to traditional correspondence education, presupposes opportunities for student interaction, whether live or mediated, as well as for student independence.

Print Supplemented

Distant learners will not have to wait until 2001 for correspondence instruction with an audiovisual supplement. Audiocassettes now accompany printed lessons as a matter of course, particularly in the developed nations where audioplayers and recorders are owned by large numbers of people. Canada's University of Waterloo, for instance, employs cassettes to bring professors' lectures to its correspondence students. Cassettes are also used to record instructors' critiques of exercises submitted by students, an easy and inexpensive way to add a human touch in a remote learning situation (Pike, McIntosh, and Dahllof 1978).

In 1982, the Corporation for Public Broadcasting/Annenberg Schools of Communications (CPB/ASC) Project funded a U.S. demonstration "to explore the role that audio/radio components, including drama, interview, documentary materials and other production formats, can play in correspondence courses" (Annenberg/CPB Project 1983, p. 4). The CPB/ASC, to be referred to throughout this paper, was established by former Ambassador Walter Annenberg to support the production of high-quality, college-level TV courses and instructional telecommunications demonstrations.

The award for the demonstration project was made to the Committee on Interinstitutional Cooperation (CIC), comprised of the Big Ten universities and the University of Chicago. Under its provisions, the University of Wisconsin is developing a new correspondence course in U.S. history that will include 13 half-hour audio/radio units with special accompanying print materials. Similar audio and print supplements will be designed for already existing courses in sociology and psychology. The CPB/ASC announcement states that research "will explore the implication of adding audio/radio to correspondence courses for student appeal and learning gains" (ibid.).

There can be little doubt that audio/radio programs, especially the professionally produced and performed dramas and documentaries made possible by such underwriting, will add "appeal." If the experience of other projects is any guide, the audio/radio programs will help pace correspondence students in their study and stimulate them to complete the course. Perry (1977) notes that

> correspondence study is characterized by a very large student drop-out rate, and I am convinced that one reason for this is that many people lack the drive and dedication to maintain their work over a long period without an enforced pacing mechanism. (p. 105)

As Perry and others have pointed out repeatedly, such programs impart a sense of community, or "togetherness," to adults studying on their own.

A legitimate question can be raised, of course, as to the necessity of expending significant funds to produce audiovisual materials to supplement instruction at the university level where, presumably, the degree of initial learner motivation is already high. It is true that the CIC materials can be shared by other institutions at modest cost. But perhaps such audiovisual materials are employed more appropriately in support of correspondence

instruction at a more basic level, as they are now employed in several European projects.

In Denmark's Danish for Adults project, for instance, short TV and radio programs and cassette recordings are used to recruit and motivate students needing further education in their mother tongue. The bulk of the direct instruction is left to the correspondence lessons. Some of the TV and radio programs are linked to telephone referral services. Others feature dramas and vignettes of family life centered around someone's decision to enroll in further education courses (Harry, Kaye, and Wilson 1982b).

Another program in which both TV and audio have been used to complement traditional correspondence study can be found in Toulouse, France. The Centre National d'Enseignement par Correspondance, a part of the French Ministry of Education, offers correspondence courses in basic French and mathematics for adults. The print lessons were supported, from 1975 to 1978, by weekend TV programs intended to motivate students. Although the TV and radio broadcasts have been discontinued, the French course is still supported by audiocassettes (ibid.).

Videodisc

There are further implications for the design of correspondence study in projects now in progress assessing the interactive potential of videodisc and microcomputer. A group at the University of Nebraska is the recipient of a CPB/ASC grant "to develop and test experimental interactive videodiscs as alternatives to conventional science laboratory lessons in physics, chemistry, and biology" (Annenberg/CPB Project 1983, p. 4). The production phase of this project has been completed and pilot discs are being field-tested in colleges and universities. The discs are designed so that a student "can perform science laboratory experiments via a personal computer interfaced to a videodisc player" (Nebraska Videodisc Group Newsletter 1983).

As already indicated, the disc has advantages that make it more valuable for instruction than the videocassette, notably freeze frame, slow motion, and retrieval (Feasley 1983; Norwood 1982). Current disc technology allows for programming progress tests and a variety of self-tests. In addition, a sizable amount of text can be carried by the frames.

Developers of the discs argue that simulations are often more effective than real-life experiments. Perry (1977) and members of the science faculty at the British Open University, where "home experiment kits" are supplied to students, contend that long laboratory sessions for undergraduate students are really unproductive since the scientific method can be learned more economically in other ways.

Unfortunately, attempts to exploit the interactive videodisc for home science study may pose serious problems. For one thing, at present most people cannot afford the cost of the players themselves. However, this obstacle may disappear when (as seems certain) retail prices drop as videodiscs come into wider use for home entertainment. For another, designing instructional

materials for the disc is a sophisticated and lengthy process, with costs reportedly running from $50,000 to $100,000 for a single interactive disc. In short, the technology is too costly to make widespread educational uses feasible ("Interactive Video" 1984, pp. 8-9).

Nonetheless, in parts of the world where per capita income is high (e.g., Sweden, the United States), it is not unlikely that some home correspondence instruction, particularly in the natural sciences and technical subjects, may be supplemented by the videodisc. As will be noted later, the disc is now finding a market in training programs conducted at business and industrial sites.

Microcomputer

As yet, there are very few correspondence study programs utilizing the microcomputer or the personal computer. But it is almost a certainty that this number will grow in the near future, particularly as personal computers become less expensive and are found in more homes. At present, TeleLearning Systems, a proprietary organization headquartered in San Francisco, offers an Electronic University with a repertory of primarily informal self-help and leisure-time courses. The first enrollment for college credit, arranged through Thomas Edison State College (New Jersey) was also widely publicized.

The TeleLearning System permits students to link their computers to an instructor's or to an "electronic mailbox" via the telephone. One advantage to the participant is, in the words of the promotional brochure, that "all the protocol sign-ons, and other complexities of computer communications have been eliminated . . . all you do is push one button on your keyboard." The principal advantage, of course, is that the system is interactive. A tutor at the other end checks the learner's work and sends comments back electronically.

TeleLearning is being promoted presently as a self-contained teaching structure. What strikes an observer as significant is that the American Management Associations (AMA), a reputable professional development agency of long standing, already has a series of courses on the system. TeleLearning officials also report that a number of colleges and universities are interested in adapting formal credit courses to the system.

Another feature of TeleLearning that may attract private home study institutions even more than nonprofit agencies is that the materials are marketed through computer stores and other retail outlets. Courses now being advertised cost from $45 to $100, and topics range from leisure and self-help courses to preparation for college-level exemption examinations.

Newspapers

One recent variation of print-based home study employs a medium familiar to everyone: the inexpensive, easy-to-carry, and easy-to-use newspaper. The University Extension of the University of California in San Diego started Courses by Newspaper (CBN) in 1973 (Courses by Newspaper Fact Sheet n.d.).

(For unannounced reasons, the project, much of whose funding came from the National Endowment for the Humanities [NEH], recently has been suspended.) Of the courses produced, seven are in areas where the insights and content of the humanities can be applied to issues of general concern (e.g., Moral Choices in Contemporary Society, Justice in America, Death and Dying).

CBN courses were written by scholars and authors in the fields covered. Typically, a course includes a collection of readings, a student study guide, and audiocassettes usable in sparking discussions at home or in study centers. In addition, participating newspapers carry 1,250-word articles every week for 15 weeks. (These articles are also available in booklet form.)

Students enroll through colleges in their own areas. If, however, no local college is a participant, the student is invited to enroll through the University of Minnesota Department of Independent Study. A local participating institution must agree to schedule at least two contact sessions for students, and is encouraged to arrange for guest speakers, films, and so forth (Courses by Newspaper Fact Sheet n.d.).

The University of Mid-America (UMA) also employed newspaper articles as elements in its multimedia teaching systems. Neither UMA nor CBN published information as to how valuable students found the newspaper supplement.

A West German project is modeled on CBN. Called "Newspaper College" (Zeitungskolleg), it is a service of the German Institute for Distance Studies (DIFF) in Tübingen. Newspaper supplements are carried by as many as 200 papers and reach as many as 3 million people within the region. The format is similar to that of CBN: 12 weekly newspaper features prepared by specialists, a reader, a study guide, and meetings in local high schools.

By the end of 1981, the Zeitungskolleg had finished its pilot phase and was designing its sixth course. Unlike their American counterparts, the German officials have conducted extensive evaluation based on questionnaires and interviews (Harry, Kaye, and Wilson 1982b). Results indicate that the method is effective.

Another North American newspaper project, begun in 1974, is located in Montreal. It involves as partners the College Marie-Victorin and La Presse, the largest daily French-language newspaper outside of France. The authors of a Unesco-sponsored report do not acknowledge any debt to CBN, but state only that the newspaper is an "ideal medium" for distance teaching (Use of a Newspaper 1983). Assessment results indicate that the method is a successful one in reaching students at a distance, although an important part of the teaching method is the scheduling of "lecture evenings" on campus.

Summary

The growth of distance education is the result of an historical coincidence: a public demand for more educational opportunities for adults at a time when media, especially electronic media, capable of delivering instruction to people, wherever they may be, are proliferating. Distance education

has grown, too, because it has proved to be remarkably versatile, satisfying a wide range of educational needs, from extramural extension of postsecondary instruction to adult basic education.

Distance educators, particularly in Europe, have devoted much attention to formulating theoretical foundations for the movement. Details aside, all agree that what makes distance education distinctive is the physical separation of teacher and institution supplying the instruction. Instruction is "mediated" principally by way of print materials and often through video, radio/audio, and the telephone.

Recent developments in communications technologies, however, have put new and flexible delivery methods at the disposal of distance educators. Media such as microcomputers, interactive videodiscs, and satellites, are giving old-fashioned correspondence study a new look and new dimension. Audiocassettes have become a common supplement to print lessons. There is every likelihood that correspondence lessons will soon be enriched and made interactive through the use of personal computers.

The relationship between these media and distance education is a reciprocal one. That is, whenever a new medium with distinctive properties and potential appears, distance educators are challenged to reach new audiences in new ways.

Audiences for distance education programs can be fairly accurately described. In the developed nations, they include adults employed full-time, housewives, and the institutionalized. Many are people who were deprived of educational opportunity in their youth. In developing nations--as well as in some developed nations--audiences include recent high school graduates for whom there are not enough places in the traditional higher education system.

THE BROADCAST MEDIA AND DISTANCE EDUCATION

The broadcast media, television in particular, have made so great an impact on distance education that they warrant consideration in a separate section. Television, of course, has been bringing instruction to students on and off campus for more than 30 years, but only within the last 15 years has it gained widespread acceptance as a powerful vehicle for formal instruction. The British Open University, which formed a partnership with the British Broadcasting Corporation (BBC) in making television a part of its multimedia teaching system, made educators all over the world aware of the potential of the medium. Since 1968, U.S. community colleges have demonstrated how strong an instructional and affective tool television is as part of the multimedia telecourse.

The Public Broadcasting Service's recent inauguration of its Adult Learning Service, which makes a schedule of telecourses available to public television stations across the country, has also made the colleges and universities in the United States aware of the uses of television for instruction (Brock 1983). In addition, the steady spread of multichannel cable TV systems, with their frequent provision of channels for use by educational institutions, has renewed higher education interest in television (Groves, Reid, and Bray 1983).

Historical Background

Perceptive adult educators were quick to recognize the potential of the open broadcast media--first radio and later television--for bringing formal and informal instruction to people in their homes. The University of Wisconsin, still a leader in extension education, went on the air with its educational radio station, WHA, in 1919. In 1925, there were about 170 licenses assigned to U.S. educational institutions.

In England, the British Broadcasting Corporation was aware from the beginning of the educational potential of broadcasting (Briggs 1961). As early as 1926, there was a proposal for a "wireless university." By 1927, the BBC had set up an adult education section.

From the educator's point of view, commercial interests have largely dominated the mass media in the United States. By 1934, when the Federal Communications Commission (FCC) was established, commercial interests had taken over the AM band. It was not until 1945, several years after it had been authorized, that the FCC set aside a part of the FM band for educational programming.

The development of television parallels that of radio. Between 1947 and 1950, TV became a part of everyday American life and commercial interests vied for licenses. In 1952, however, after intense pressure from educators and others, the FCC reserved channels in 242 communities for noncommercial educational users. The first educational television (ETV) station, as such stations were then known, was KUHT-TV, licensed to the University of Houston. It went on the air in May 1952.

Funding from sources such as the Ford and Carnegie Foundations spurred the growth of similar stations. Finally, stemming in large part from recommendations of the Carnegie Commission on Educational Television (Killian and others 1967), the Public Broadcasting Act of 1967 (P.L. 90-129) was adopted during the Johnson administration. Both the Corporation for Public Broadcasting (CPB) and the Public Broadcasting Service (PBS) were established, with National Public Radio (NPR) created in 1970. Thus began what is known as public broadcasting, as distinguished from the older educational broadcasting.

Broadcasters and Adult and Distance Education in the United States

There have not been many fruitful, long-running partnerships between broadcasters and distance educators in this country, as there are in the United Kingdom where adult educators and the BOU work together with the BBC. The situations in the two countries are not directly comparable, however, since the BBC is under direct government control.

An American broadcaster and educator states that "for many broadcasters, the instructional television and radio experience has not been good" (Adams 1979, p. 12). Colleges and universities using TV to deliver college-level courses to adults off campus have all too often used it only to broadcast lectures. The talking teacher in front of the grey flannel drop became the model for ETV programming.

Commercial Broadcasters and Distance Educators

Attempts by commercial broadcasters to present instructional programs to learners around the country have only been moderately successful. The short-lived NBC "Continental Classroom," which ran from 1958 to 1963, was a notable experiment. Funded largely by the Ford Foundation, it was prompted by the Soviet Union's launch of Sputnik, which fixed the Nation's attention on the inadequacy of science education in the schools. The first "Continental Classroom" course, "Atomic Age Physics," was aimed at science teachers. About 500 enrolled in the course, which was carried by the National network. Some enrollees earned credit from participating colleges and universities.

"Continental Classroom" was noteworthy in its attempt to wed big-time TV techniques to distance education. Noted professors were recruited to prepare and present courses. They were paid as much as $40,000 for the year spent in preparation, a handsome academic salary for that time. Treated like star performers, they were even provided such perquisites as apartments in New York, research assistants, and free schooling for their children.

In 1963, network officials concluded that the annual budget of about $1.5 million was too high, particularly since the Ford Foundation had discontinued its support, and the project was cancelled. Ironically, producers say that one of the last courses in the series, "American Government," drew an audience of 1.5 million--a figure that must stand as a record for participation in an adult education program (Carlisle 1974).

CBS's "Sunrise Semester" was the other serious commercial network foray into adult and distance learning. Relatively long lived, surviving from 1963 until 1980, this early morning series (6 a.m.) was coordinated by New York University. Credit enrollments were never high, but "Sunrise Semester" had a steady and loyal audience for the stream of courses it presented. Its budget was always low, and studio production was minimal (Carlisle 1974).

Public TV and Distance Education

Although a good number of public television stations are licensed to educational institutions, relationships between adult and distance educators and public broadcasters have not been smooth. In fact, they reflect the short history of instructional television itself, which "followed a curve downward from enthusiastic acceptance . . . in the 1950s to the malaise that settled in during the 1960s," with an upward swing in the 1970s (Zigerell and Chausow 1974, p. 7). Rather naively, it seems in retrospect, some educators felt that the advent of public TV and public radio heralded a new and exciting era in adult education and educational broadcasting.

The consistent availability of air time, however, was a problem for schools not owning a broadcast facility (Purdy 1983). There was an even more serious problem in the lack of suitable programs to be aired. The New York University of the Air, a broadcast-based distance learning model that operated from 1966 until 1971, is a notable instance of a project that failed. Although originally promising, the program lacked sufficient air time and was forced to repeat too frequently its slim supply of effective courses. The result was a vicious circle: the University had to plead with the managers of New York State's public broadcast stations (which were community owned) for the scarce air time; frequent repetition of the same courses meant dwindling audiences, which, in turn, justified the stations in their refusal of air time (Purdy 1983; Zigerell 1971).

The Chicago TV College

One of the earliest and hardiest of the pioneer open broadcast services for the distant learner was Chicago's TV College. An extension of the City Colleges of Chicago, TV College still operates today, after more than 25 years. It is one of the few U.S. TV-based postsecondary institutions that worked.

Starting in 1965 as a 3-year project underwritten by the Ford Foundation, it soon became a fixture in Chicago-area higher education. By 1974, when the last official project report was published (Zigerell and Chausow 1974), TV

College could claim a total of more than 150,000 enrollments. About 400 men and women had completed their associate in arts degrees via TV, and about 2,200 graduates of campuses of the City Colleges of Chicago had finished, on an average, about one semester of their work via TV, an even more impressive figure. This latter figure is indicative of an important effect--an almost serendipitous one--of broadcast-based distance education projects: they encourage adults to enroll in conventionally taught programs.

TV production specialists found much to deplore in what they called TV College's "talking head" programs, which usually featured a professor at a blackboard or lectern with meager visual support. Yet thoughtful observers and evaluators, aware of the goals the College had set for itself--making it possible for adults to complete significant portions of an undergraduate curriculum without leaving their homes--singled it out as a consistently successful example of college-level instructional television. Fred Hechinger, the long-time and highly respected education editor of the New York Times, had words of praise for it in several columns. Judith Murphy and Ronald Gross (1966), in a study sponsored by the Ford Foundation, called it a "highly successful experiment," while finding little else in U.S. instructional TV to approve. A perceptive British educational writer commented, "It [TV College] doesn't go in for prestige, but for quiet, solid usefulness" (Zigerell and Chausow 1974, p. 10).

For the first dozen years or so of its history, TV College was a model of a partnership between an educational (later a public) TV station and a public college. As many as 25 hours of TV programming per week were presented during fall and winter academic terms, with another 9 hours during summer terms. Courses were produced in the station's studios by station technical personnel.

To ensure that a full complement of courses leading to the associate degree was always available, TV College opted for simulated classroom performances, rather than for programs with high production qualities that could not be completed quickly. With sufficient air time and with a steady rotation of courses, TV College maintained a sufficiently high level of enrollments term after term to present its courses at a cost per credit hour no more than that of educating students on campus.

Relations between the public TV station and the college deteriorated, however. The station management, understandably, wanted to devote scarce broadcast time to programs that attracted large audiences, not just the small numbers interested in direct instruction. Further, a second generation of instructional television producers had arrived. The "talking head" professor was giving way to highly visual and documentary approaches, to programs shaped by the demands of the medium rather than by those of the lecture hall (Zigerell 1979).

The sharp reversal in fortunes that TV College experienced turned out to be a blessing in disguise. Loss of access to station production facilities and growing audience demand for professional production quality in all TV programming forced the college to lease well-designed courses produced elsewhere and to share high production costs through coproduction agreements with other institutions. TV College, now absorbed by the Chicago City-Wide College, is

still on the air, with its programs broadcast by a UHF station owned and operated by the City Colleges of Chicago.

TV College has demonstrated that it is a genuine and enduring alternative to on-campus study. On one occasion, a young wife and mother who completed the associate in arts degree entirely by television told a newspaper interviewer that instead of "being a make-shift alternative, TV College was in fact the best choice" (Zigerell 1979, p. 4).

Radio and Distance Education: The U. S. Experience

As stated earlier, the history of educational radio is a history of unrealized promise in providing informal and formal distance education opportunities for adults. Although more than 200 broadcast licenses had been awarded to educational institutions by 1936, only 38 educational stations were actually on the air (Wood and Wylie 1977). Some of these licenses were held by K through 12 school districts that were never in a position to support extensive uses of the facilities. However, the most important reason for failure to exploit the medium was "the lack of commitment by educational leaders to developing the medium for educational purposes" (Purdy 1983, p. 29).

Despite the bleak record overall, there have always been colleges and universities that make effective use of radio. The University of Illinois and Purdue University, to mention only two, employ university-licensed stations to bring classroom lectures and discussions to audiences listening in their homes. Some schools--Wisconsin, Kansas, Michigan, Minnesota, Oregon State--have founded "Schools of the Air." On commercial radio, the CBS American School of the Air ran from 1930 to 1940.

In recent years, radio as an instructional tool has been regarded by some as a stepsister to TV. But interest in the medium has been mounting, both as an adjunct to TV in distance education projects and as a system in itself. The BOU has always considered radio broadcasts essential supplements in its system. Radio is employed to support TV and print lessons, handle essential course "business," and prepare students for examinations. U.S. TV-based projects have made similar use of radio.

The renewed attention to radio stemmed largely from the establishment of National Public Radio (NPR) in 1970. In fact, many NPR affiliates are licensed to colleges and universities. Until NPR's recent financial reverses, stations and program services were mushrooming.

In 1983, the Annenberg/CPB Project displayed its faith in radio as a distance teaching tool by funding an NPR course called "Global Understanding," two radio/audio series examining "political behavior in two world regions with long-standing ties to the United States--Western Europe and China and Japan" (Annenberg/CPB Project 1983).

As mentioned earlier, the FCC now permits FM stations to employ subchannels to carry programming to audiences with radios equipped with special decoders. Advocates of radio in adult and distance education see Subsidiary

Communications Authorization (SCA) bands as having great potential for reaching specialized audiences: the visually handicapped, off-campus students, and professional and occupational groups (Brightly 1979).

One obvious reason for the renewal of interest in radio is that, even when well produced, it is far less expensive than TV. Another is the consistent research results showing that there are no significant differences in teaching effectiveness among the various media--print, radio, film, and television (Chu and Shramm 1967; Perraton 1983).

Radio Outside the United States

Radio is used extensively for instructional purposes in parts of the world where geographic isolation or economic and social conditions make it feasible. Some uses--in New Zealand, for example--are not primarily for adults, but are to equalize educational opportunities for elementary and secondary school pupils in remote areas (Schramm 1967). Other programs combat basic literacy problems in underdeveloped nations. Radio Togo, for example, with Unesco support, runs a series called "L'Heure Rurale" aimed at people who listen in study groups in their villages. The broadcasts, both in French and local dialects, are devoted to public health, civics, and social affairs. The Radio School of Honduras broadcasts programs of basic education for the indigenous population (Schramm 1967). Radio ECCA (Emisora Cultural de Canarias) in the Canary Islands also aims instruction at the disadvantaged. The curriculum includes courses in basic literacy and in practical subjects like accounting. The radio programs are explanations in simple language of printed master sheets that listeners have before them as they listen, an interesting example of how practices and media deployment in distance education systems are shaped by regional needs and socioeconomic contexts (Cepeda 1982).

Summary

Uses of open broadcast media for instructional purposes go back to the immediate post-World War I period, when educators both in this country and the United Kingdom recognized the potential of radio for extending education to adults. Adult educators also hailed television as a powerful medium. Unfortunately, with few notable exceptions, commercial broadcasters in the United States were never willing to devote much air time to direct instructional broadcasts.

Unfortunately, too, from the adult educator's point of view, only a few long-standing and productive partnerships have developed between public broadcasters and educators. Air time on open broadcast channels is a scarce commodity, and in the past much instructional television was substandard in quality. With the advent of the PBS Adult Learning Service and with the professional quality of the instructional programming now being produced, there are signs that productive partnerships between adult educators and public broadcasters may be formed.

Radio, as a relatively inexpensive way of extending education to adults, particularly in the area of basic learning and life-coping skills, finds wider use outside, rather than inside the United States.

COMBINING THE TECHNOLOGIES AND THE ART OF INSTRUCTIONAL DESIGN

A Time of Increasing Collaboration

From the preceding section, a reader may have inferred that productive collaboration between public broadcasters and educational agencies is the exception rather than the rule. Now, however, it seems as if a new day may be dawning for cooperative efforts.

A number of factors came together in the late 1970s and early 1980s to persuade educators and the general public that instructional telecommunications could be more than a marginal activity in adult and higher education. First, several reports commissioned by influential organizations made the educational community aware of the extent and the effectiveness of telecommunications in instruction. Second, in 1982 PBS created a de facto open broadcast educational and instructional network called the Adult Learning Service. It also announced the formation of a National Narrowcast Network (NNS) that will employ nonbroadcast transmission to deliver instruction to highly specialized audiences. Third, there was continued refinement of the arts of instructional design and telecourse production. Fourth, multichannel cable TV systems multiplied throughout the country. Fifth, Walter Annenberg's award of $150 million over a 15-year period to the CPB/Annenberg Schools of Communication Project generated keen interest in telecommunications uses in the higher education community.

The Reports

The report that made the strongest impact on both the general public and the educational community was A Public Trust, commissioned by the Carnegie Foundation (Carnegie Commission 1979). Published as a commercial paperback, it was read throughout the country. The conclusions of the blue-ribbon panel that conducted the study are unassailable: people learn as well from TV and radio as they do in the classroom, and America has yet to exploit the potential of broadcast for education. The authors recognized that there are unavoidable tensions between educators and public broadcasters. The latter see their mission as being cultural in a broad sense, while the former feel that educational programming must be structured so as to achieve specific learning outcomes.

Shying away from recommendations applicable on a nationwide scale, the authors urged each station to "carve out for itself" what it sees as an appropriate instructional role in its own community. Direct instructional services may involve nonbroadcast technologies like cable TV, ITFS, microwave, or FM subchannels. The report also recommended that CPB, through its Program Fund, support the research needed to discover what and how television can teach

best, as well as to underwrite and encourage the efforts of local stations as they support exemplary programs with their own resources.

This report, although general in its recommendations, has stimulated much valuable discussion and exploration of ways broadcasters and distance educators can work together.

Another study investigated patterns of TV and radio utilization by U.S. colleges and universities. The Corporation for Public Broadcasting (1979) and the National Center for Education Statistics sponsored the first Higher Education Utilization Study. Investigators found that of the 3,000 institutions surveyed, 61 percent used TV for instruction, 25 percent actually offered courses on TV, and 36 percent used TV to enrich other instruction. The most extensive TV was found to be in public 4-year colleges and universities that utilized closed-circuit TV on campus. The 2-year colleges, on the other hand, concentrated more of their efforts on serving adult learners through off-campus employment of TV instruction.

An earlier report, a joint effort of the American Association of Community and Junior Colleges, CPB, and the National Center for Education Statistics, sought to determine the extent of TV use for instruction in 2-year community and technical colleges. The findings disclosed that 65 percent made use of TV for both on- and off-campus instruction. Among those employing broadcast TV, more worked with PBS stations than with commercial stations (Kressel 1980).

Another CPB-supported project, the Station-College Executive Project in Adult Learning (SCEPAL), was conducted concurrently with the report just cited. Its purpose was to investigate relationships between PBS stations and the postsecondary institutions offering TV courses. It was felt that such an investigation was timely, since more and more colleges were presenting TV courses to students watching off campus and looking to PBS stations for air time.

A genuinely useful and informative document came out of SCEPAL, Telecourses: Reflections '80 by Munshi (1980). Since the objective of the project was to provide an assessment of the state of the art in telecourses, the document provides a comprehensive review of telecourses and their design, their audiences, telecourse utilization by colleges and universities, and the economics of telecourse use. A short chapter on the relations between colleges and TV stations emphasized the need for both parties to understand each other's problems--problems that stem from distinctive goals and missions.

Broadcaster Initiatives

PBS has responded to the challenge for a greater number of more fruitful partnerships with education through two projects: The Adult Learning Service (ALS), operational since 1981, and the National Narrowcast Service (NNS), scheduled to go into a pilot phase in 1985. ALS is a broadcast service of PBS stations around the country. It presents courses for college credit, mostly at the lower-division level, where audiences are sizable. Popular telecourses produced by major academic designers are distributed.

The Adult Learning Service serves the "large target groups" for which open air time is most cost-effectively reserved (Brock 1983). In its first semester of operation ALS claimed enrollments of about 20,000, with 500 institutions awarding credit and 120 PTV stations airing the satellite-delivered courses. According to recent PBS news releases, enrollments now stand at about 50,000 each term.

The second initiative, NNS, can be characterized as a higher education/public broadcaster alliance formed in response to a revolution in postsecondary education today. According to the former PBS president responsible for its formation, millions of adults are in vocational and skills training programs conducted by agencies other than colleges and universities (Grossman 1983). Many of these people can be reached off-campus--in their homes, at work sites, in community centers--by the new narrowcast TV technologies, particularly cable TV and ITFS.

These adult learners represent small audiences, and PBS has long felt that there is not enough open channel space available to serve the numerous learning needs of small, discrete audiences (National Narrowcast Service Demonstration Project 1983). NNS will link ITFS systems around the country through the PBS satellite interconnection. Local PBS stations will retransmit the signals into homes with cable TV connection, and to offices, factories, or libraries equipped with receiving equipment. The plan also calls for presenting college-level courses.

PBS has already acquired a number of licenses for unused ITFS channels around the country. The Annenberg Project has announced that it will help underwrite the initial phase of the activity.

It should also be noted that there are plans for other ITFS-related networks to provide a variety of programming to adults in their homes and at work. Now that FCC regulations permit educational ITFS licensees to lease up to 75 percent of channel capacity to commercial interests, it is likely that both nonprofit and proprietary educational institutions will be encouraged to develop outreach programs for distance learners. ITFS has long since proved its worth and effectiveness in delivering specialized vocational training and continuing professional education to narrow target audiences at a distance.

The Telecourse and the Instructional Designer

Presently, the telecourse may stand as America's major contribution to the technology-based distance education movement. A telecourse, designers insist, must be distinguished from what is called loosely a TV course or a course on television. Rather, the contemporary telecourse is the result of a lesson learned by educators who were struck by the power of the TV medium to open up new worlds to the mind. TV, they learned, "to be effective . . . must be expensive, and must be produced for and used with broad population bases so that an economy of scale is achieved" (Luskin and Zigerell 1978, p. 9).

In the late 1960s and 1970s, it became apparent that putting a camera on a lecturing professor or a classroom demonstration barely scratched the surface

of television's teaching potential. By that time, too, educators at all levels had had extensive experience with closed-circuit TV in the classroom, as well as with in-school instruction presented on open broadcast. Much of the experience was disillusioning for both teachers and students. The latter, weaned on commercial TV, expected production polish and entertainment from programs, whether commercial or instructional. The former found it did little to enrich classroom instruction.

At this time, a group of educational professionals known as instructional technologists or instructional designers emerged. They have special training in developing mediated systems of instruction and exploring "some of the further reaches of media in learning" (Gross 1975, p. 1). Instructional technology was defined, in somewhat ideal terms, in a 1970 report as

> a systematic way of designing, carrying out and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication, and employing a combination of human and nonhuman resources to bring about more effective instruction. (Tickton 1970, p. 19)

People possessing these skills are members of the teams designing telecourses at Coastline, Dallas, and Miami-Dade Community Colleges, the Southern California Consortium for Community College TV, and other locations. Such specialists also serve on the teams that develop courses at the BOU. The materials that result provide an adult distance learner with a systematic kind of learning experience. The video and audio materials produced are informative, stimulating, and entertaining.

Telecourse Development

Several telecourses of the early 1970s were taken as models for a new and distinctive distance teaching mode. The community colleges were responsible for two of them: "As Man Behaves," produced by Coastline Community College in 1970, and "Man and Environment," produced by Miami-Dade Community College in the same year. Another important event was the initial PBS telecast of the BBC's "The Ascent of Man" in 1974. Coastline, Miami-Dade, and the University of California Extension at San Diego were quick to see the promise of this series, produced originally for general audiences, for formal instruction. As a result, the "wrap around" telecourse was devised. The video programs and the accompanying trade book are combined with student study guides, exercises, and other study materials to convert what was a general audience series into a college credit course (Munshi 1980).

Naturally, to produce telecourses that contain large amounts of film shot on location, animated sequences, and dramatizations is costly. But the high cost of instructional series like "As Man Behaves" or "Understanding Human Behavior," popular Coastline courses in introductory psychology, can be justified on the grounds that leasing arrangements enable the producers to recover their investment. In addition, the production quality is such that the programs of the course appeal to general viewers, an inducement to TV station managers to air the series at desirable times.

The attractiveness of these products and their broad appeal have encouraged commercial publishers to invest in community college telecourse productions, as well as to publish course study guides and adapt existing textbooks to accompany the programs. Among major publishers who have been involved in community college telecourse productions are McGraw-Hill and CBS Educational and Professional Publishing.

As might be expected, skeptics on occasion question whether entertainment and instructional goals can always be reconciled. They wonder if the instructional producer can be all things to all people, serving both general and narrow-interest audiences (R. Smith 1983).

The Telecourse System

A leader in telecourse development has defined their instructional method in the following way:

> [A telecourse provides] an integrated learning system that employs television and various print materials. This system is specifically designed to involve a variety of learning strategies to forge a complete education unit available to the student in the convenience of his own home. [It] is not a correspondence course with pictures; nor is it a televised lecture with supplementary readings. It is an examination and presentation of a body of knowledge and information through the use of sight, sound, color, movement and print in a manner designed to stimulate, motivate, clarify, and quantify. A telecourse is designed to take maximum advantage of the strengths of each component to lead the student through a "success-oriented" experience. (Gripp 1977, p. 18)

Video programs provide the focus of the telecourse. Telecourses produced in the United States contain a substantial video portion, typically 26 to 30 half-hour programs. Some doubt that so many programs are necessary in a 3-credit-hour course. From the community college producer's point of view, however, the programs are a helpful surrogate for the time an on-campus student spends in a classroom.

Video courses produced for National distribution have high visual interest, featuring filmed segments, animation, guest interviews, dramatic pieces, and other devices. Most have a professor/host, whether he or she is an academic or a professional actor. It seems fairly certain that distance learners feel more at ease with and prefer an authority figure in instructional programs (Duby and Giltrow 1976).

Although the instructional functions of the video programs themselves have not been well defined, producers "use the medium to its fullest capacity, providing illustration of processes and places, engaging a student's attention, and speaking to the affective domain" (Munshi 1980, p. 3). Above all, video and audio programs pace distance learners in their work, since they can derive the fullest benefit from a program only by preparing for it.

Print materials are an essential component of the telecourse, just as they are in other distance education formats. Once the "talking head" teacher disappeared from the telecourse, "essential functions of summarizing, synthesizing, and prescribing for the student were transferred to packages of supportive materials" (Zigerell 1979, p. 7). The study guide, therefore, is an important document. When well prepared, it lays out objectives clearly; presents overviews of lessons; explains student assignments; and contains self-scoring quizzes, glossaries of key terms, and suggestions for further reading.

In addition, designers in the United States usually prescribe a textbook for a telecourse (unlike BOU designers who prepare course syllabi that, in effect, are self-instructional textbooks). With "wrap around" courses like "The Ascent of Man" or "Civilisation," the text may be what was originally a trade book adapted for student use. In some series designed originally as credit courses, study guides may be keyed to several popular texts in a field so as to give users a choice.

It should also be noted that telecourses usually presuppose a variety of local support services--telephone conferences, meetings with tutors or coordinators, computer-based counseling or evaluation--that the distance learner is free to use.

A final word about "wrap around" telecourses is in order. Often, the print materials to accompany the video programs prepared originally for general viewers must be prepared very quickly, so as to be ready for the scheduled PBS prime-time showings. In some cases, there is no chance for consultation between TV producers and academic teams during the production of video programs, and the printed materials seem to be afterthoughts.

Design Procedure

The first step in the telecourse design process is a formal or informal needs assessment. Institutions that present telecourses on a regular basis make frequent use of surveys of audience needs and viewer demographics.

Once a need is determined for a given telecourse, a planning team is formed, and a process that may last several years begins. A team is made up of the following: an administrator knowledgeable about the mass media, an instructional designer, a TV producer or producer/director, a cinematographer or film expert, a video editor, scriptwriters, content specialists, graphic artists, and a technical production staff. (The team preparing an audio series is similar, except, of course, for the video and film experts.) More often than not, a telecourse designed to be marketed nationally is a collaborative production, with as many as six or seven institutions as investing partners. Each of those partners has a content representative on the team (Pohrte 1980).

The team approach to course design and production is associated particularly with the BOU and has been discussed at length by Perry (1977) and others. Admittedly, it can be cumbersome and result in delay. Perry asserts, however, that "there is no doubt that a course produced by this method will

inevitably tend to be superior in quality to any course produced by an individual" (p. 91).

Range of Telecourses Available

There are about 150 telecourses in fairly extensive use in this country. Not all have so large a video portion as the community college-produced courses, nor are all of uniformly high production quality. Yet most are constructed along the lines just described.

Community colleges, as indicated, are major telecourse producers. Other telecourses are produced by universities or by PBS stations in cooperation with colleges and universities or scholarly organizations. Institutions or agencies that produce and distribute telecourses (e.g., the Maryland Center for Public Broadcasting, the University of Southern California) maintain catalogs of materials available for lease or purchase. The Instructional Telecommunications Consortium of the American Association of Community and Junior Colleges also publishes a catalog of available telecourses, Catalog of Mass Media College Courses (Zigerell 1980).

Networking Media and Institutions for Distance Education

The Right Mix

A distance education model's shape is determined by the particular needs of the region in which it is based. An assessment of distance education from 1969 to 1975 conducted by Perraton (1982) shows this clearly. In the Western World, the trend has been toward making the home a miniature school. This is so because adult educators can reach learners in their homes with both print and media-based materials and provide, at the same time, a variety of sophisticated support services.

In the Soviet Union, on the other hand, distance education projects are closely associated with work and work sites. The All Union External Polytechnic, the principal correspondence institute, is concerned with improving production techniques. In fact, workers receive support in the form of leaves from work to complete study.

In the nations of the Third World, the forms of distance education are closer to those of mainstream traditional education. The projects, as a matter of fact, place great emphasis on training teachers for conventional teaching.

Thus, distance education is shaped by society's needs and resources. In the Western World, distance education has been employed as an alternative to reach men and women outside the conventional educational structures through media to which they have access in their homes or in easily accessible off-campus sites. In the Socialist Bloc, focus is on improving industrial production, and, consequently, distance education is closely related to work. In the Third World, distance education forms are adjuncts of traditional

education, and are aimed at men and women who were never part of the educational mainstream. The emphasis is on helping people "catch up" and learn skills that are taken for granted by distance education projects elsewhere.

Trends in Media Use

The distance education projects that have made a real impact in the United States and Europe have usually been multimedia systems. The pioneer Chicago TV College, which began primarily as an open broadcast service, moved to a media mix once nonbroadcast media were available to it. One of the reasons for its success has been its incorporation of videocassettes, computer, telephone, and (whenever feasible) radio, in addition to printed material, programmed instructional materials, and correspondence homework (Weinstock 1975).

Print itself, the staple of all distance education, has undergone great refinement in the last 15 years due to the word processor; more imaginative employment of color and layout; and the effective use of study and interactive devices such as self-scoring exercises, pretests, posttests, and displayed lesson overviews (Keegan 1983). The unpretentious audiocassette has become a favorite medium because academics preparing distance learning courses feel they can "integrate cassettes more tightly into course design" (Bates 1983, p. 233). Audiocassettes have multiple uses: for mastery learning drills; for comments on graphs, charts, illustrations in texts and printed lessons; as supplement or follow-up to TV programs; for documentary enrichment such as interviews and conversations; and for lectures by specialists and well-known figures.

Bates (1983) has investigated 12 distance learning institutions to determine trends in media use. Among the institutions surveyed, seven are characterized as "autonomous credit-giving multi-media systems established solely for distance learners" (p. 228): Pakistan's Allama Iqbal Open University, Canada's Athabasca University, Israel's Everyman's University, Poland's National Radio and Television University for Teachers, the BOU, Sri Lanka's Institute of Distance Education, and Costa Rica's Universidad Estatal a Distancia. The investigation disclosed that broadcast radio and television are being used less and less, either because partnerships between academics and broadcasters are difficult to maintain or because open broadcast time for instructional programs is hard to come by. In some of the projects--Tanzania's Institute of Adult Education, for example--not enough people have access to broadcast.

The study notes, "the range and combination of media available" for distance education is suddenly bewildering" (ibid., p. 237). In the developed economies of the West, for example, the adult educator can choose media that best serve the needs of home-based learners on the basis of accessibility, convenience, teacher control, interactive capability, and immediate availability. According to Bates, the best choices at this time given these criteria seem to be print, audiocassettes, and the telephone.

A United States Multimedia Demonstration Model

Some projects, like Chicago's TV College, become multimedia systems by accretion rather than design. The one U.S. project planned as a multimedia system, the University of Mid-America (UMA), failed to achieve its overall instructional goals and was dissolved with the termination of National Institute of Education support in 1982. While in operation, the project was engaged in four kinds of activities: (1) designing multimedia postsecondary courses for adults studying in their homes, (2) conducting research on adult and distance learning, (3) helping its consortium members deliver student support services, and (4) marketing its materials throughout the country.

The universities that were members of the UMA consortium employed a variety of media for instruction: broadcast TV, cable TV, FM radio, videotapes, audiotapes, the telephone, and the newspaper. During the early years of the project, considerable effort and large sums of money went into the production of video programs. The video component was sharply reduced when investigation disclosed that "most adult learners want television-based courses, but do not want to feel that they are being entertained or want to have their time wasted" (Lewis 1983, p. 207). UMA, in fact, sponsored useful studies of what adult distance learners find valuable in video presentations (Aversa 1983a).

UMA's failure to survive was not attributable to shortcomings in its multimedia mix or to its enrollments, although those were never impressive. (It must be remembered that it was located in a part of the country that is not densely populated.) It failed, rather, because of its organization and the lack of a coherent curriculum plan. As a nonautonomous institution, it found itself "at the mercy of cooperating universities that reserved the right to validate or not to validate its courses" (Zigerell 1983-1984, p. 41). In addition, courses, no matter how effectively mediated, were offered randomly rather than planned with any "curricular rationale" (Zigerell 1979, p. 9). Ironically, its course developers seemed to ignore their institution's own research on the needs and credentialing interests of their target audience (University of Mid-America 1978).

Other Media Mixes

Not surprisingly, most distance education systems employing a mix of the electronic media are found in this country. Lewis (1983), of the Center for Learning and Telecommunications in Washington, D.C., has surveyed some 70 projects representative of U.S. telecommunications-based systems. All the institutions described in his study, Meeting Learners' Needs Through Telecommunications, are capable of reaching students on and off campus via communications media. On-campus sites are involved because many part-time adult students nowadays combine conventional classroom study with telecommunications-based study in campus learning centers, such as libraries and learning centers. They do this for convenience and to reduce travel.

Lewis (1983) reports that institutions that "rely heavily on noninteractive technologies like broadcast radio or television" use their homes and community sites as study centers. Those, however, relying on interactive audio,

video or computer technology use on-campus and remote sites such as plant locations instead (p. 52). Indeed, taking courses at work sites is a frequent pattern. Students may be electronically linked to live classes as they are being taught on campus, or may view videocassettes of classes at sites set aside by employers for the purpose. The University of Wisconsin Extension alone maintains about 200 remote learning sites. Some contain sophisticated equipment--facsimile machines, for example, that copy library materials.

Electronic Links

Colleges and universities in the United States offering specialized professional education make effective uses of nonbroadcast video and audio to reach adult students off campus. The TAGER TV network in Dallas/Fort Worth was established in 1967 to tie together higher education institutions and industry. Graduate-level engineering, business, and computer science courses are transmitted on four ITFS channels, microwave links, and cable TV. The system is currently being equipped to receive signals from a satellite (Lewis 1983).

Engineering schools now make extensive uses of electronic links in their continuing education programs. Stanford University pioneered the employment of ITFS to extend professional and graduate-level education to engineers and technicians who view programs at plant sites within 50 miles of the campus. A consortium of engineering institutions called the National Technological University has just been formed. Together with its parent organization, the Association for Media-Based Continuing Education for Engineers (AMCEE), it will use satellite to deliver credit and noncredit courses to industrial and plant sites and via cable to homes all over the country.

The satellite, as is apparent, further enhances the prospect of overcoming constraints of place and time for adult learners. Distance learners can be active, participating members (usually via audio hookups) of classroom discussions going on hundreds of miles away. Recordings of satellite-delivered programs can be played and replayed at the convenience of learners. The ANIK-B Interactive Instructional Television Project at the British Columbia Institute of Technology (BCIT) transmits professional and general education courses via satellite from two studio/classrooms on campus to interactive centers throughout the province. Evaluation studies conducted by BCIT confirmed what has been discovered elsewhere: people learn effectively at a distance through this kind of technology (Yeoell 1983).

The satellite and ITFS-based models just described are effective with highly motivated, special interest audiences whose strong career goals make them willing to accept video programming with minimal production quality.

Reaching Distance Learners over Wider Areas

ITFS is low-power, line-of-sight transmission. But with help from relays and translators, its signals can travel longer distances. California State University at Chico operates an ITFS/microwave system in a service area of

over 30,000 square miles with a population of little more than a half million. Live classes and videotaped materials are transmitted to learning centers as far away as 170 miles. ITFS and interactive audio have proven to be effective ways to provide educational opportunities to people unable to travel long distances to campus. Enough courses are presented via the system, in fact, that the adult studying at a distance can complete a significant portion of a degree program (Meuter, Wright, and Urbanowitz 1983).

Media Mixes and Their Implications

What is impressive about these models--and many more could have been listed--is that they demonstrate that adults can learn almost anything at times and places that suit their convenience. Telecommunications technologies now available to institutions at prices they can afford deliver sound instruction over long distances. At the same time, the technologies can be made interactive and allow distance learners to interact with instructors and fellow students as if they were actually sitting in the classroom.

The Rise of Instructional Telecommunications Consortia

Reasons for Growth

Educational users of computer services have long since realized that such services can be employed on a cost-shared basis with no loss of efficiency to anyone. Likewise, colleges and universities using other telecommunications technologies have begun to turn to cooperative methods of financing outreach programs (Beaty 1979).

The reasons for this are several: (1) to share scarce resources, (2) to distribute over a broader base costs that otherwise would strain the capabilities of one institution, and (3) to encourage more effective design and utilization of telecommunications-based instructional materials.

Kinds of Consortia

There are as many types of consortia as there are purposes in forming them. Some are formally chartered and offer their dues-paying members a range of informational and support services. The Eastern Educational Consortium (EEC), which numbers some 40 colleges, universities, and public TV stations in 5 states, is an example of such an association.

Others are organized on a looser basis. Members of the Maryland College of the Air join, leave, and rejoin, depending on whether or not they elect to offer for credit any of the telecourses selected by the group as a whole for broadcast in a given year (Maryland College of the Air 1982; Zigerell 1983).

Consortium Activities

Some consortia--the Instructional Telecommunications Consortium (ITC) of the American Association of Community and Junior Colleges, for example--are concerned with broader issues of encouraging curriculum and materials planning and production. Still others, like the Florida Community College Television and Radio Consortium, acquire materials collectively so as to reduce costs for their smaller institutional members (Hobbs 1983). The West Virginia Higher Education Instructional Television Project operates in a similar way (Channell and Parker 1983).

The activities of other groups are shaped by their commitment to a particular delivery system. New Jersey, for example, has linked 42 cable systems so as to form a statewide cable channel "by which the specialized educational, political, religious, cultural and entertainment needs can be fulfilled" (Cable Television Network 1982).

The Appalachian Community Service Network (ACSN), a nationwide satellite communications network, represents a distinctive consortia arrangement. Like the PBS Adult Learning Service, The Learning Channel, which ACSN owns and operates, transmits credit and noncredit telecourses on a subscription basis. ACSN also supplies services its participating institutions might find hard to provide for themselves, such as faculty development workshops and evaluations.

One of the most recent of the partnerships to further adult distance education is the PBS Adult Learning Service. It is based on two premises: first, "that a national distribution service can effect economies of scale" for high-quality programming; and second, "that local broadcasters and local educators should exercise control over their own broadcast channels and curricula" (Brock 1983, p. 350). Local colleges and universities pay course use and per-student fees in order to offer the telecourses, which are broadcast by public TV stations, for credit. ALS also makes a number of informational and support services available to participants--in effect, forming a consortium.

New Training Tools for Business and Industry

There is growing consensus among distance educators and adult educators in this country and in Europe that adult interest in discipline-based curricula is lessening in favor of stronger interest in professional and vocational training. In short, adult educators are becoming more concerned with occupational and vocational training programs (Moore 1981). PBS's augmentation of the Adult Learning Service with the National Narrowcast Service can be seen as illustrative of this trend. Even the BOU, which since its inception has been concerned primarily with degree-directed and general education curricula, has announced its intention to concentrate more on short vocational courses (Walker 1984).

Partnerships

The array of communications technologies now readily available and the spiraling costs of conventional professional development programs make it almost certain that business and industry will turn to technology-based approaches in their training activities. Media-based continuing education in engineering has already been mentioned as an example of how technology can be employed to serve a professional group whose skills and knowledge are subject to rapid obsolescence.

It is likely that the training seminar, a time-honored staple of inservice training programs, will be transformed. "As teleconferencing, video, personal computer, and satellite technologies continue to expand, they hold an increased potential to deliver the ongoing seminar" (Bergman 1981, p. 17). The "electronic bulletin board" has already been used effectively by universities to deliver engineering and management instruction to adults on off-campus locations, with the distance learners using their personal computers to put their assignments, questions, and project reports on the bulletin board (Eldridge 1982).

How significant a role formal higher education institutions will play in the preparation of telecommunications-based professional and occupational training is a matter of conjecture. Feasley (1983) believes that due to cost, certain of the newer technologies such as videotex and computer-driven videodiscs may find almost exclusive use in private business and industrial training programs. Nonetheless, it can be predicted that colleges and universities will develop computer and other courseware to the specifications of corporate trainers.

Already higher education/private industry partnerships have been formed to provide teleconferencing for training. The National University Teleconference Network (NUTN) and the Campus Conference Network of the Public Service Satellite Corporation (PSSC) organize development and training programs for business and professional agencies, with colleges and universities supplying content advisers and presenters. Both organizations employ satellites to link locations (NUTN News 1984; Young 1982).

Finally, the less glamorous and more familiar of the communications technologies will be employed more and more to put the skills and knowledge of faculties at the disposal of corporate trainers. The University of Wisconsin Extension now presents professional continuing education courses through a dedicated four-wire audioconferencing network. Using a slow scan/freeze frame TV system, still pictures of the instructor, slides, and graphs can be sent to the system's 23 sites (Lewis 1983, pp. 226-228).

As adult and distance educators are well aware, "bridging the gap between the world of the classroom and the world of work [is an] important task for the future" (Shively 1982, p. 101). To achieve this end, a growing number of partnerships between educators and corporate trainers will be forged.

Summary

Despite early disappointments and false starts, there are now signs that public broadcasters and educators are beginning to cooperate in productive ways to bring education to more adults. Several widely publicized reports commissioned by private and public agencies have alerted a broader public to the educational/instructional potential of the broadcast and other telecommunications media. Public broadcasters themselves have shown initiative in setting up services like the PBS Adult Learning Service and the National Narrowcast Service.

Educators have learned to design and produce attractive telecourses that broadcasters are willing to air and that adults find appealing and instructive. In addition to their visual appeal, the telecourses are well-designed multimedia learning systems for distance learners.

At this time, distance educators, especially those in the Western World, have a wide range of media at their disposal. Successful projects employ media mixes that typically combine print, video, audio, and the telephone. While projects that serve adults in their homes tend toward noninteractive media like television and radio, those that serve adults on campuses or in work sites employ interactive audio, video, and computers.

Institutions interested in telecommunications-based instruction have also found it advantageous to form associations, or consortia, to share scarce resources, distribute program production and use costs over a broader base, and encourage further design and wider employment of telecommunications materials. There are many such consortia throughout the U.S. Finally, given the increasing adult interest in vocational-occupational training, adult educators are displaying strong interest in partnerships with business and industry.

Partnerships for teleconferencing in training and professional development already exist. Certain of the newer technologies, especially those with interactive capabilities--videotex, computer-driven discs--are presently too costly to find wide adoption by educational institutions, given the narrow base of enrollments involved. Business and industrial trainers are recognizing their potential for specialized training. Colleges and universities, it is reasonable to assume, may soon be contracting with business and industrial training divisions to produce instructional materials for such telecommunications systems.

DISTANCE EDUCATION: AN INTERNATIONAL MOVEMENT

The British Open University

Few events in the history of higher education have had the impact of the British Open University that has been referred to repeatedly in this study. It captured the imagination of adult educators, politicians, and the general public alike. Now well into its second decade, it has already inspired the creation of a number of similar institutions in both the developed and developing nations. It has also prompted many to reconsider previously unquestioned notions as to the form university-level education should take, who is entitled to it, and when in life it should be experienced.

Some even argue that the chartering of the BOU in 1969 was as significant an event as the establishment of the U.S. land grant colleges in the 1860s: "Each provided a serious sustained learning opportunity for large numbers of people for whom higher education had never been available" (Houle 1977, p. ix).

The body of literature on the BOU is large and still growing. By now, the history and development of the institution has been recounted many times. But a brief sketch is in order due to BOU's position as a propelling force in distance education.

Origins

Lord Walter Perry (1977), for many years vice-chancellor of the BOU, has written an anecdotal history of the institution. He describes the political climate in which the BOU was born, beginning with a 1963 Glasgow speech by the Labor Party's Harold Wilson that led to a 1966 white paper proposing a "University of the Air." Wilson was determined to harness "technological advances in the media of mass communications to the service of education" (Perry 1977, p. 9). His idea, not surprisingly, was immediately denounced as a "pipe dream" by conservative and influential spokespersons such as the editors of the Times Educational Supplement.

The flash point of the story, in Perry's words, was the appointment of Jennie Lee as a minister responsible for the arts in the Labor government. In 1965, Wilson (then Prime Minister) asked her to assume responsibility for the University of the Air. It was under her strong and stubborn leadership that the idea of the BOU evolved. She insisted in the 1966 white paper that a TV channel be set aside and dedicated to the venture.

Further, one paragraph in her white paper was unequivocal: there was to be "no question of offering to students a makeshift project inferior in

quality to other universities" (Perry 1977, p. 17). Thus, the two issues relating to distance or open education that preoccupied planners were brought to the forefront: excellence and equality of opportunity.

By 1966, the name of the proposed university had been changed to the Open University, in token of its commitment to openness to all. Planning for the project went ahead with such speed that the first students were admitted in 1971.

Curriculum

BOU planners committed themselves to creating a self-standing institution where adults could earn a general or a first-class degree within a reasonable length of time. In fact, an adult studying part-time can earn a degree in 3 years, although this is unusual.

The Scottish university model was adopted, with students taking 6 year-long courses for a general degree. The honors degree requires two additional courses. The curriculum is a mixture of foundation courses, that is, inter- or multidisciplinary introductory sequences, and advanced-level courses.

Course Preparation and Instructional Method

The one element of the BOU teaching method that caused the most discussion and, according to its proponents, guarantees high academic standards is the course team approach to curriculum development. Responsibility for teaching methodology, it was decided, would not be vested in academic departments, but in the university as a whole. This decision led to the course team notion, with each team consisting of academic personnel, educational technologists, and BBC TV and radio production staff. The underlying rationale is that a team brings together academics from various disciplines, of key importance in multidisciplinary curricula. In Perry's words, a team provides "the expert knowledge . . . needed to make the course suitable for adults working in isolation through correspondence texts and radio and television broadcasts" (Perry 1977, p. 84).

BOU distance learners learn in many ways, and not always at a distance. They are sent correspondence units at regular intervals. They write essays, do experiments at home, and take assessment tests, some of which are graded by computer and some by tutors.

The university tries to humanize instruction as much as possible. Tutors, therefore, are expected to maintain contact with students from the foundation courses onward. The student, too, is invited to report to one of the 260 BOU study centers where face-to-face sessions with tutor counselors and other students can be held. Students are also required to attend week-long summer school terms at facilities leased from other institutions.

In some courses, BOU students listen to radio broadcasts once a week. They also watch TV programs, the frequency of telecasts varying with the

subject matter of the course. In a few courses, the broadcasts "provide the only place where a particular topic is taught" (Clennell, Peters, and Sewart 1983, p. 335). Students watch or listen at home or in study centers. Videocassettes are sometimes available; audiocassettes always are.

By 1980, the BOU had almost 120 courses. The faculty write the self-instructional texts that accompany the courses and design home laboratory kits for the science courses. In fact, the BOU has become a major publisher and mail-order house for texts and study materials. Its publications are available overseas through commercial publishing houses.

BOU's approach has been adopted, with varying degrees of success, by other multimedia distance teaching projects. In recent years, however, doubts have been raised as to whether the course team is crucial to success and whether distance education must pay so "obsessive an attention to instructional perfection" (Griew 1982, p. 191). Developers of Japan's new University of the Air have decided not to adopt the course team method because they feel it may waste time and become inordinately expensive.

Student Demand for BOU

Initially, questions were raised as to how extensive and how lasting student demand would be. Skeptics said that many students would be attracted, but that few would complete the course. By 1980, 39,000 degrees had been awarded. Ten years earlier, when applications were received for the first year, there were 40,000 applicants for 25,000 places.

Interest has remained high year after year, with some drop-off in recent years attributable to an increase in student fees to about $250 per course, high by British standards. Available places now range from 17,000 to 20,000 each year. Officials contend that enrollment figures demonstrate that there is a continuing "demand for degree-directed study among working adults" (McIntosh, Woodley, and Morrison 1983, p. 193).

Student Characteristics

The BOU student body, especially the first group that entered in 1971, has been studied exhaustively (McIntosh, Calder, and Swift 1977). When examining data on the student body, an observer must always keep in mind that the BOU has an open admissions policy. Applicants are admitted on a first-come, first-served basis, subject to the necessity of distributing students evenly among areas of study.

With the exception of a short period when 18-year-olds were accepted on a trial basis, students below age 21 are not usually admitted. Officials decided on this cutoff age because, as Perry comments, they felt that distance study requires "qualities of maturity . . . usually lacking in people as young as 18" (1977, p. 57). The university also reserves the right to advise some applicants to take preparatory courses before actually enrolling in BOU.

From the standpoint of the government and BOU founders, the important question is whether the BOU really reaches adults from disadvantaged sectors of society who have never had a chance at higher education, particularly working-class people aspiring to higher occupational and socioeconomic status. There is no doubt that the composition of the student body is somewhat disappointing in this respect. Working-class occupations and women have been consistently underrepresented (McIntosh and Woodley 1975; McIntosh, Woodley, and Morrison 1983). Such groups as teachers and technicians have been consistently overrepresented, although since 1978 their percentages have been declining. Fifty-eight percent of the students are male; about half of them ate between the ages of 21 and 30 (Craig 1980).

The prevailing impression is that these students have the educational qualifications to enable them to apply at other British institutions. All in all, their chances of graduation stand at 50 percent and the success rate thus far has been high. By the end of 1978, 54 percent of the original 1971 entry group had obtained degrees. Numbers earning course credits in the first two years of study are high, in the 80 percent range, but lower in subsequent years. When assessing completion rates, howevet, the observer must remember that the BOU permits its students to enroll on a trial basis before they pay their fees in full and complete official enrollment.

Lessons of the BOU for Distance Educators

Distance educators everywhere can learn valuable lessons ftom the BOU. It is a remarkable success because it fills an educational void and offets adults setvices not available from existing institutions. Unlike most U.S. distance education projects, it is not a mere appendage to, or an extension of, an existing system. Rather, it is designed as an alternative from beginning to end.

It also demonsttates that the mass media enable distance educators to reach heterogeneous audiences with excellent instructional materials, provided support services are devised to serve individual diffetences and varying levels of background and ability (McIntosh and Woodley 1975). In shott, the BOU has ptoved that an autonomous, degree-directed distance education institution can be successful on a national scale.

There are also lessons to be learned. For one thing, it now seems apparent that there is not the blue-collat demand for degree-directed study that BOU foundets had believed. In recognition of this fact, the BOU is now moving into the area of continuing education, where programs are not planned in terms of degree requirements.

Second, thete is a hatd lesson to be learned from BOU attempts to serve individuals who had been denied access to university education. The educationally deptived are the least likely to profit from teaching methods of the kind developed at the BOU (McIntosh and Woodley 1975).

Third, thete are clear indications that distance teaching on the whole has limitations. Not everything can be taught in this way as effectively as social sciences and humanities.

Fourth, the notion that distance education is inexpensive has made it popular with some people. This is not always the case. A report published under BOU auspices argues that distance learning is more accurately characterized as no more expensive than other forms (Dodd 1981).

Influence of the BOU throughout the World

Perry, in his history of the BOU, complains good-naturedly that much staff time always had to be devoted to visitors from all over the world who came to observe and study the institution. Many came with a view to adapting the structure to their countries. The same political, social, and economic factors that led to the chartering of the BOU were at work in other societies during the 1960s and 1970s. Yet reasons for founding similar institutions varied. In some countries, as in the United Kingdom, projects were needed to make higher education more accessible than the conventional closed system. The Japanese and the West Germans were concerned with creating more places for the young who could not be absorbed by the traditional universities. The Socialist nations, as already indicated, are interested in distance education as a means of improving efficiency in the industrial workplace and increasing gross national product (Rumble and Harry 1982).

In any event, with the success of the BOU as inspiration, a number of distance and open universities have been established throughout the world. Others are in the process of formation. Those already established include UNED in Spain, Athabasca in Canada, the Fernuniversität in West Germany, UNA in Venezuela, Universidad Estatal a Distancia in Costa Rica, the Free University of Iran, the Open University in Thailand, and the Netherlands Open University.

Some Models and Their Goals

Readers interested in detailed descriptions of the open or distance education universities or educational institutions now operating throughout the world would be best served by consulting The Distance Teaching Universities by Rumble and Harry (1982). For the purposes of this study, we shall look quickly at several models that reflect the varying goals of distance education projects.

Costa Rica. Costa Rica's Distance University (Universidad Estatal a Distancia--UEAD) is typical of projects in developing countries (Rumble 1978). Its purpose is threefold: (1) to serve those unable to start or continue study at the country's three conventional universities; (2) to serve agricultural and industrial workers with university-level ability who are unable to attend a conventional university; and (3) to bring an opportunity for study, including non-university-level adult education programs, to the general adult population. The curriculum is targeted at specific audiences, for example, teachers, public administrators, and bank employees. UEAD confers all degrees.

The influence of the BOU is apparent in the curriculum and the delivery system. All students must take common foundation courses. TV and radio programs are broadcast nationwide. Video and audiocassettes are stored in study centers. Home experiment kits are employed, and students receive face-to-face instruction.

The Costa Ricans depart significantly from the BOU pattern in that their courses are written by single authors, a practice not uncommon in foreign adaptations.

One problem encountered in Costa Rica is typical of problems that can arise when the BOU structure is transplanted. There is a serious materials distribution bottleneck in that the post office will not handle packages.

Israel. Everyman's University, started in 1976, has goals similar to those of the Costa Rican UEAD. Objectives are to serve the socially and educationally disadvantaged, to upgrade teachers, and to supply a range of adult education courses. The delivery system is multimedia (Seligman 1979).

German models. West German educators are concerned with creating more university places for adults than the traditional university system can provide. In East Germany, however, distance education has been characterized as a "specific form of studies which does not entail interruption to professional work and can be started by working people who have reached university entrance standards and have obtained professional experience" (Schwartz 1983, p. 360).

Canada. Distance education projects modeled after the BOU in the English-speaking world outside the United Kingdom and the United States strike an observer as eclectic in their makeup. Athabasca University in Alberta, Canada, which has received a good deal of attention, exemplifies this. It offers a variety of courses, some locally produced, some adaptations of BOU courses, others leased. The local productions are designed by teams, following BOU procedure.

While some of the courses are even conventionally taught, most are designed for self-instruction at home. TV programs, broadcast on open air or via cable, accompany some courses. There is a full complement of printed materials, as well as audiocassettes that are mailed to the student. Students can also telephone tutors free of charge or meet with them in local study centers.

Japan. Japan's University of the Air (UA), as now envisioned, will offer three general curricula: natural and applied sciences, social sciences, and the humanities. Requirements parallel those of the conventional universities, not surprising in that one of the major project goals is to serve 18-year-olds who are now too numerous for the traditional institutions to absorb. UA's other goals are to give working adults and housewives a chance to earn degrees or complete university-level study and to employ instructional technology to enhance instruction (Zigerell 1983-1984).

The hope of effecting change in the nation's higher education structure is a familiar objective in BOU adaptations around the world. The Japanese, like

the British, trust that an open admissions system will eventually bring about changes in a traditionally elitist structure. They also foresee that UA students will demand the right to transfer credit to conventional universities.

U.S. models. Only two projects in this country rank as national distance education systems comparable in any way to the BOU, as they are the only nationally-based U.S. projects offering degree-oriented liberal studies curricula. One, the International University Consortium (IUC), uses BOU-designed courses as the core of its curriculum. The courses were adapted for American use by the University of Maryland University College, the only U.S. institution to be consistently successful in employing BOU curriculum materials.

The IUC, with funding from the Carnegie Corporation, the Maryland Center for Public Broadcasting, and the University of Maryland, is a consortium of approximately 25 U.S. and Canadian colleges. According to its director, IUC's goal is "to create a nationwide system of colleges, universities, broadcast stations, and cable systems to work together to offer quality B.A. degree programs to highly motivated adult part-time students" (Hershfield 1981, p. 43).

TV programs are delivered by satellite to participating PBS stations around the country for direct or delayed broadcast. Credit for courses and degrees are awarded by member IUC institutions. Enrollments thus far have been on the modest side, but IUC officials point out that even with only 15 to 20 students enrolled in a course, participation is cost-effective for a college.

Since BOU materials are intellectually demanding, IUC students tend to be highly motivated men and women with prior successful college or university experience.

The other U.S. project is the To Educate The People (TEP) Consortium. Organized with labor union support, TEP is an outgrowth of a program originally developed at Wayne State University. The curriculum is interdisciplinary in the University of Chicago/Columbia general education tradition and has been adapted "to respond to the type of life experiences most working adults bring to postsecondary education" (Lewis 1983, p. 192).

Like IUC, TEP is not an autonomous organization. Rather, it is a consortium of some 20 or more 2-year and 4-year colleges and universities located throughout the United States. The teaching system is similar to that of the BOU: courses are accompanied by TV programs, weekly class discussion, and on-campus weekend seminars.

TEP has been the recipient of several grants from the National Endowment for the Humanities and the Fund for the Improvement of Postsecondary Education (FIPSE). The latest FIPSE grant is being used to establish a model for nationwide cable delivery system.

Adult basic education models. The BOU, through its example of effective use of the mass media in reaching distance learners, has also stimulated adult basic literacy projects in Europe and elsewhere. A two-volume study of the issues involved in the use of mass media and distance education methods for

adult basic education was carried out by a BOU team for the Commission of European Communities in 1980 and 1981. Among the important conclusions are the following: too little has been done in adult basic education with distance teaching techniques, distance teaching methods can be effective, and there is a "dearth both of suitable materials and experience in using multi media methods" (Harry, Kaye, and Wilson 1982a, p. 94).

The second part of this study presents case studies of adult basic education projects in which distance teaching methods are being employed. They include projects in Belgium, Denmark, France, the Netherlands, Portugal, Spain, and the United Kingdom. Among them are ones aimed at unemployed adults (Canal-Emploi, Liege), depressed rural populations (Tele-Promotion Rurale, France), and the urban disadvantaged (Popular Adult Education, Portugal).

Projects employing radio and TV do so to motivate and bring real-life situations to bear on the teaching contained in the correspondence materials (Harry, Kaye; and Wilson 1982b).

As might be expected, multimedia distance education programs for adult basic literacy have been more common in southern Mediterranean countries and the Third World, where the illiteracy rate is high. As long ago as 1960, for example, Italian broadcasters expanded an elementary and secondary school project for adults to include an adult literacy series called "It's Never Too Late" (Schramm 1967).

Similar efforts to employ distance education techniques in U.S. adult literacy education have been sporadic and nonsystematic. Currently, a TV series produced by the University of Kentucky is being used to encourage early school leavers to earn high school equivalency through the General Educational Development (GED) test. As of 1980, there were no reliable data available on how many adults are involved in the course and how many take the GED as a result (Munshi 1980).

Although distance learning experience indicates that sophisticated multimedia methods are least effective with the poorly motivated and disadvantaged adult (Bartels 1982; Dodd 1981; McIntosh and Woodley 1975), the Western developed countries will have to devote much more attention to distance adult basic education. The BBC has already taken the lead in the United Kingdom, where the immigration of large numbers of Asians and Africans unable to speak and read English makes the need for nontraditional methods imperative. There is a similar need in the United States, where there have been large influxes of Hispanics and others from different cultures.

Maintaining Quality in Distance Education Projects

Standards

Distance educators themselves agree upon certain criteria against which systems can be assessed. First of all, to be considered useful and valid, a distance education project must rest on an articulated philosophy and organizational framework. Second, there must be specialized instructional

techniques to meet the distinctive needs of distance learners. Third, the resources and the trained personnel to produce effective learning materials must be available. Fourth, in the opinion of most distance educators, strong student support services in the form of tutoring, supplemental instruction, and counseling must be present. Finally, provision must be made for staff development and ongoing evaluation of the project (Gough 1980).

There will always be some who remain skeptical about distance education, arguing that it never can be effective. Others are skeptical as to whether certain media are effective as delivery systems (R. Smith 1983). Admittedly, it is difficult to say what is meant by the term "effectiveness." If the question is phrased, "Is distance education as effective as conventional education?" it is tempting to answer with another question: "How effective is conventional education or conventional teaching?"

Certainly, distance teaching has one obvious merit. It is carried on in an accessible manner for all to see, not behind the closed doors of conventional classrooms. Second, even if the study materials are not created by a team of specialists in the BOU fashion, most are products of people who have valid claim to expertise in the field (Dodd 1981).

Arguments for excellence in distance education can be made on educational, economic, and ideological grounds (McIntosh and Woodley 1975), as well as in terms of the objectives of a given project. Some critics feel that, from the purely educational standpoint, the open admissions policies of distance education projects preclude high academic quality--an argument that could be made about the quality of some conventional programs. BOU researchers, however, report that even students who do not possess qualifications to seek admission to a conventional university do well in distance education. They show a "propensity to learn" (McIntosh, Calder, and Swift 1977).

One measure of quality is student satisfaction. Student testimonials are easy to gather in distance education projects. The Chicago TV College once conducted a follow-up study of students who had enrolled in conventional college and university programs after taking self-study TV courses in their homes. Almost all of the 300 surveyed reported that they learned as much by TV as they did in the conventional classroom (Zigerell and Chausow 1974).

There are, of course, dissatisfied students--as there are in conventional programs. Then too, there is always an unshakable conviction in some quarters that because distance education is different, it is second rate. Perhaps the most compelling answer to objections raised about distance education is to reply that these systems are working worldwide.

Evaluation and Accreditation

It would be naive to assume that distance education projects never suffer lapses of quality. Indeed, the proliferation of media that can transmit instructional programs beyond normal jurisdictional boundaries has created concern in the accrediting agencies of this country, where educational control has always been local and decentralized. A distance education organization

can transmit materials and enroll students in areas in which it has established no physical presence.

Project ALLTEL. Anticipating an increase in the number of agencies that will disseminate technology-based university-level and continuing professional education materials regionally and nationally, the Committee on Postsecondary Accreditation (COPA) and the State Higher Education Executive Officers (SHEEO) undertook a project called Assessing Long Distance Learning via Telecommunications (Project ALLTEL). The project began in 1983 with a grant from the Fund for the Improvement of Postsecondary Education (FIPSE). Its purpose was to develop a set of principles to guide institutional administrators, statewide administrators, and accreditation agencies in evaluating distance learning programs. A related purpose is to guard consumers against inferior programs, as ease of access to telecommunications media increases the dangers of unethical practices.

The project approach has been positive in the sense that, from the very beginning, it was made clear that "policies and procedures should encourage the development and use of technology for educational purposes" (Project ALLTEL 1983, p. 1). Emphasis has been placed on working with established accreditation mechanisms, rather than on creating new sets of procedures. The focus is on developing cooperation among institutions awarding credit for telecommunications-based distance learning, State authorities, and accrediting bodies. In short, ALLTEL officials recommend that an institution develop a definite plan for distance education activities which, once approved within the institution, is to be submitted to State authorities for their approval. The State, in turn, indicates to regional accreditation agencies that certain distance programs meet quality requirements.

Project ALLTEL is also recommending common assessment procedures for multistate authorization. Regional, National, and special accrediting bodies are urged to establish "parallel standards and procedures for off-campus programs, including instruction delivered via telecommunications" (ibid., p. 3). It seems particularly significant, from the standpoint of furthering distance education, that all organizations involved in telecommunications instruction are urged to "utilize and further develop rigorous outcome measures subject to validation" (ibid., p. 1). This recommendation, if followed, will shift evaluation from measuring process (e.g., class contact hours) to measuring performance.

State policies. As telecommunications-based instruction grows, it is to be expected that State higher education authorities will be forced, either by concerned faculty or out of a desire for quality, to establish guidelines and policies. The Coordinating Board of the Texas College and University System appointed a committee in 1983 to formulate policies governing telecourses. The committee recommended that telecourses be offered on a regular basis, provided they are the equivalent in quality to similar courses on campus. The only issue in the Texas recommendations that alarms distance educators is a suggestion, not implemented as yet, that courses completed by television be so identified in student records (Texas College and University System Coordinating Board 1984).

The suggestion that telecourses be specially labeled in student records underlines a problem that stems from the relationships between distance education projects and the traditional higher education community. While the problem also exists elsewhere, in the United States it is especially acute due to the strong tradition of local autonomy. In this country, much distance education planning is conducted on the fringes of the regular academic divisions. As a result, in the eyes of some academics and administrators, distance education projects do not reflect the best thinking or efforts of institutions.

A statement by D. B. Varner, former president of the University of Nebraska and the University of Mid-America--although intended to describe how distance learning planning differs in the United States--contains an accurate diagnosis of a persistent problem in distance learning:

> The dangers of poor quality are very real, and the regular faculties could hang us on this issue. There's a high degree of fragmentation in this field. . . . And we are too much separated from the mainstream of higher education which we'd better figure out how to rejoin. (K. Smith 1983, p. 200)

Summary

Distance education is an international movement. This is due, in large measure, to the emulation of the British Open University and its distinctive multimedia system in many parts of the world.

Distance learning systems in other parts of the world emulate features of the BOU system in varying degrees, depending upon national need and resources. In the United States, projects do not generally have a nationwide base but are extensions of local institutions. The traditions of local educational autonomy preclude the development of a U.S. institution fully comparable to the BOU in mission or operations.

BOU success has also sparked interest, especially outside the United States, in adapting the system to teaching basic skills to adults at a distance.

THE RESEARCH AND WHAT IT SHOWS

Sources

By now a considerable body of research has grown up around distance learning and teaching and the uses of media. Much of the important research has come out of the BOU or appeared under BOU auspices. In fact, BOU staff have even prepared multimedia packages to acquaint faculty and interested nonprofessionals in such matters as the employment of TV in specific areas, learning from broadcasts, and the design and use of audiovisual materials.

The Open University Distance Education Research Group (DERG) also publishes monographs every year on various aspects of distance education. Some are descriptions and analyses of certain systems. In 1983, for example, monographs were prepared on California's Coastline Community College as well as on institutions in Central America, Sweden, Canada, the Netherlands, and Germany. Other publications deal with special teaching strategies and support services--library services, tutorials, and so forth.

Foreign journals devoted exclusively to distance education also are valuable sources of information on current research. They include the BOU's Teaching at a Distance, the Australian Distance Education, and the London-based Epistolodidaktika. They contain studies of specialized distance teaching functions, studies of uses of media, and studies of student support services. Unfortunately, these particular journals are not generally held in educational collections in the United States.

In this country, valuable research has come out of the University of Mid-America. Much UMA attention, especially in the first years of the project, was given to marketing concerns, needs assessment, and factors that determine why adults choose to enroll or not to enroll in distance education projects. A number of UMA investigators have been keenly interested in evaluation. Some of this interest centered on determining the kinds of revisions to be made in courses and study materials (Aversa and Forman 1983). Much was strongly influenced by the investigations of McIntosh, who gathered information during her association with the BCU on students and their interaction with the system (Aversa 1983b).

From time to time, U.S. studies relating to telecourse use, specific course materials, and the adults who enroll in telecourses have appeared (Anandam n.d.; Dallas County Community College 1979; Erickson and Chausow 1960; Purdy 1978; Rhines 1977; and Zigerell and Chausow 1974). Unfortunately, the telecourse research effort in this country has been ill coordinated overall and marked by concern with purely local issues of administration. At times, too, it has smacked of promotion rather than of disinterested investigation. One observer's comment is accurate: "Unfortunately, systematic

efforts to evaluate telecourses have been the exception rather than the rule" (Munshi 1980, p. 12).

What follows does not purport to be a full review of the research that has been done. Only those highlights most relevant to the purposes of the study are presented. Readers interested in learning more about the research conducted and the findings will find useful references at the end of this paper.

Student Characteristics

Anyone acquainted with the egalitarian goals set for distance education programs usually wants to know how well program participants represent the adult population. For example, how representative is the student body of the BOU, the International University Consortium, or the To Educate the People Consortium? How representative is the enrollment in a community college telecourse? While answers vary from project to project, they all reveal that the egalitarian goals are not being realized.

Sex

Women tend to be underrepresented in projects, especially outside the United States. This has been so in the United Kingdom despite the fact that when the BOU was inaugurated, some people feared it might be "a haven for housebound . . . housewives" (McIntosh, Woodley, and Morrison 1983, p. 178). Even though the percentage of women rose from about 27 percent in the first year to over 44 percent in 1978, women are still underenrolled (ibid.). When considering participation rates of women, an observer must always view them in light of the customs and culture of the area concerned. One would not expect a preponderance of women in a distance learning system in the Islamic world, for example.

Female representation is generally higher elsewhere. Not unexpectedly, most demographic data available come from projects at the higher education level where enrollment procedures are formalized and data can be gathered. Australia's University of New England External Studies Division reports that half its students are women (K. Smith 1983). U.S. telecourse enrollments show a more favorable rate of participation. For a number of years, the Chicago TV College female enrollment was as high as 75 percent (Zigerell and Chausow 1974). A 1984 survey of telecourse enrollments in 5 States shows 67 percent to be female (Instructional Telecommunications Consortium 1984).

Ethnic Background

Ethnic minorities are underrepresented among U.S. distance learners. According to the results of the survey conducted by the Instructional Telecommunications Consortium (1984), for example, blacks, Hispanics, and Orientals together made up about 15 percent of total enrollments.

Age

Average and median age vary with the goals of distance education institutions as well as with course content. The Instructional Telecommunications Consortium (ibid.) survey disclosed that only 15 percent of participants are in the 40- to 59-year age range, which may cast some doubt on the predictions of adult educators who see greater demands for education from older segments of the population as life expectancy increases.

The figures just noted, however, come from a survey of men and women enrolled in core curriculum courses offered mostly by community colleges. For reasons of convenience, some community college students (typically young adults) enroll in telecourses and classroom courses concurrently. It is interesting to note that 30 percent of those enrolled in "The New Literacy," an introductory computer course, were in the 40- to 59-year age group (ibid.).

All in all, David Sewart's (1983) conclusion is trustworthy: "The great majority of adults learning at a distance are in the 20-40 age range and are studying on a part-time basis in their homes" (p. 166). But, as enrollments in "The New Literacy" indicate, courses in occupationally oriented areas will attract more of the target group BOU planners originally had in mind.

Occupation and Motivation

Other significant features in the composite profile of the distance learner are occupation and motivation. Although the Instructional Telecommunications Consortium survey did not seek out information about specific occupations, most surveys show blue-collar and manual occupations underrepresented in formal study programs. A 1978 BOU occupational analysis indicated only 10 percent recognizably blue-collar occupations represented (McIntosh, Woodley, and Morrison 1983). The present British government, in fact, has indicated its desire to see more vocationally oriented courses introduced into the curriculum. BOU officials, who attribute low participation by manual workers to tuition costs, say they are already moving in this direction (Walker 1984).

The fact remains that formal distance education projects have always attracted disproportionate numbers of teachers, professionals, and semiprofessionals seeking higher credentialing. Teachers, for example, made up 30 percent of BOU enrollment when it began in 1971 and make up 20 percent today.

This imbalance is understandable, although it may be bothersome to officials of those institutions founded to provide a first chance for the educationally disenfranchised adult. As has been noted several times, success in distance learning presupposes a high level of motivation. Distance learners tend to be career oriented, with a strong drive toward credentialing, whether in the form of course credits, certificates, or degrees. Although many of the students may come from working class families, relatively few are in manual occupations themselves (Pike, McIntosh, and Dahllof 1978).

A study of enrollments in "The Ascent of Man", a credit telecourse conducted by the Corporation for Public Broadcasting, confirms this profile of

the distance learner. An examination of enrollment figures disclosed that the size of credit enrollments was directly related to the course catalog designation assigned to the series by a college awarding credit. If the course was labeled as satisfying a definite curriculum requirement, credit enrollments were high. If offered as an elective helping the student satisfy no particular core requirement, enrollments were small (Hoachlander 1977).

To become successful participants in formal distance education projects, adults usually must have definite occupational or credentialing goals. As Perry (1977) says of the BOU, "Ours is the most difficult way of getting a degree yet invented by the wit of man" (p. 167).

The often high attrition rate in distance education is further evidence of the importance of motivation. Further proof of its importance is seen in that the appeal of the teaching medium employed seems to have little effect on student success. As one investigator reports, "Students can learn equally well by about any media or method if that method is used well" (White 1980, p. 8)--to which one must add, and if students are highly motivated.

Attrition

The almost obsessive attention paid to the dropout rate in distance education attests to the intense concern with student performance. It also suggests a defensive attitude that is hardly justified. Given open admissions and the difficulties associated with independent study at a distance, a relatively high dropout rate is to be expected.

Attrition, or dropout, can also be defined in several ways. It is used to refer to those who do not complete their degrees, as well as to those who do not finish a course. For example, only one in five admitted to the BOU ever finishes a degree. The four who do not earn degrees, however, may not necessarily be "dropouts." They may have simply taken as many courses as they wanted or felt capable of taking.

Concerns about attrition, not surprisingly, have prompted evaluation projects. Canada's Athabasca University undertook a major study in 1980 in its project REDEAL (Research in Evaluation of Distance Education for the Adult Learner). Investigators attempted to identify instructional approaches and support services that improve student retention (Coldeway 1982).

The problem of student attrition has also prompted a wholesome interest in helping distance learners learn to learn. The BBC, for instance, has produced a TV series called "Use Your Head." British Columbia's Knowledge Network, an association of institutions for distance education, is also developing such materials (Forsythe 1982).

Some investigators are developing a theory of independent learning that would sort out the concepts and conditions that must be present to maximize chances of student success in nongroup learning situations. The result, as presented by one theorist, is an elaborate model of what he calls "telemathic"

teaching, a taxonomy of methods and media, and a ranking of students according to their cognitive styles and degree of autonomy as learners (Moore 1983).

Other investigators, taking a less sweeping theoretical approach, try to identify those signs that are predictive of success or failure in the adult distance learner. Not surprisingly, they relate attrition, as well as nonenrollment, to socioeconomic and other factors. All U.S. institutions offering telecourses report low enrollments and low success rates for members of disadvantaged and minority groups. A few investigators have even tried to devise withdrawal prediction formulas related to sex, socioeconomic background (as indicated by area of residence), and completion or noncompletion of an information-gathering questionnaire (viewed as indicative of the student's level of responsibility) early in the course (Giltrow and Duby 1978).

Performance

The performance of adult students in degree-directed institutions like the BOU has been carefully studied. The university publishes annual statistical reports on students and their performance. After more than a decade, there is strong evidence that students who qualify for university admission according to conventional U.K. standards, as well as those who do not, can perform at a satisfactory level in demanding university-level courses.

BOU investigators report that differences in pass rates for students can be related to previous educational background. Quite simply, those who do not qualify initially for university study at the highest level tend to do less well than those who do. While Perry (1977) notes that there was very little difference in the performances of well and less well qualified students in the first group admitted in 1971, he accounts for this on the basis of the median entry age of 27 and the fact that the students may have been a nonrepresentative group. Perry emphasizes that the "discrimination factor," or difference in performance between the qualified and unqualified, has increased steadily since, and is greatest in mathematics and science. Researchers, needless to say, are concerned that adults from educationally disadvantaged backgrounds are handicapped in distance education projects and enroll in small numbers (McIntosh and Woodley 1975; McIntosh, Calder, and Swift 1977; Waters 1983).

In the United States, the performance of adults enrolled in telecourses has been studied thoroughly. In the 1960s and 1970s, there was a stream of studies comparing the performance of students taking TV courses and those taking equivalent courses in the classroom (Chu and Schramm 1975; Reid and MacLennan 1967; Schramm 1964). While the results of some studies are unreliable because of poor experimental controls, most of the reliable studies (Purdy 1978; Purdy and Icenogle 1976; Schramm and others 1967) confirm the earlier findings that performance does not significantly differ. Whenever the performance of a TV or radio group is better, it is likely that highly motivated adult distance learners are being compared with significantly younger groups on campus (Mount and Walters 1983).

The Media and Their Instructional Effectiveness

Telecommunications Media

There has been extensive investigation of the use of telecommunications in adult learning. In general, the claims made for the media have been carefully qualified. The following is a representative conclusion: "We are certain," says one investigator, "that television and other audiovisual media do not have a null or immeasurable effect upon the learner" (O'Rourke 1980, p. 13). The effects of some variables are not easily measured by standard testing tools. For example, visual elements in the well-produced telecourse add enjoyment and appeal for viewers other than those seeking instruction.

Investigators agree that TV in particular--the mass medium that has made the most significant impact on society--has measurable effects, although no single variable can be identified. Adult educators and mass communications specialists stress that the instructional effects of TV presentation vary with the age of the viewers, their aptitude and educational background, and the subject matter (Chu and Schramm 1967; O'Rourke 1980).

There is general agreement as to what properties of TV make it effective for instruction. It magnifies small objects; it brings the outside world to the student; it can be replayed to show processes or sequences as required. There is also agreement as to what the TV medium cannot do effectively. It is not effective with material that requires slow presentation over an extensive time span, nor is it useful for illustrations and graphics that require wide eye span (O'Rourke 1980). Some observers also argue that video in noninteractive forms induces passivity in learners. This accounts for the current strong interest in developing interactive video instruction.

Media and Specific Teaching Functions

Once again, the BOU has been a leader in investigations of specific teaching functions and the media. Studies prepared by the Audio-Visual Media Research Group (AVMRG) cover a wide range of topics (see Bates 1983). Some have to do with uses of open broadcast; others with uses of specific media and formats such as radio and cassettes.

Issues have been raised concerning the supposed superiority of print, the suitability of the media for course content as opposed to student support, and the advisability of abandoning open broadcast in favor of recording technologies such as cassettes (Keegan 1983). U.S. distance educators, it must be noted, seldom raise issues of this sort--perhaps because they often must build programs around whatever media happen to be accessible.

Bates (1983)--surprisingly in view of his association with the BOU and the BBC--sees a movement away from national distance education systems employing open broadcast to systems associated with local educational institutions. In such settings, Bates argues, teachers can design materials more easily for the newer audiovisual technologies than they can for open broadcast, and students can learn to use such materials more quickly.

Summary

The present body of research into all aspects of multimedia distance education systems is considerable. Among other things, characteristics of distance learners have been carefully studied. Surveys disclose that the lower and disadvantaged socioeconomic segments of society are consistently underrepresented.

While most distant learners fall within the 20- to 40-year age group, there is evidence that the occupationally oriented study materials now appearing in greater volume attract distance learners beyond age 40 who have little or no interest in traditional academic credentialing.

Researchers have given much attention to accounting for attrition rates in distance education projects. This interest has also prompted efforts to develop special materials that help distance learners to learn.

Careful studies of the performance of distance learners show that learners are typically highly motivated and can learn via any medium that is used, provided it is used well.

Extensive investigations of the teaching functions that can best be performed by particular media have also been conducted.

CONCLUSION

Impact of Distance Education on the Field of Adult Education

The remarkable growth of distance education--spurred on, in large measure, by the explosion of communications technologies--has had a profound effect on all of adult education. Adult educators can now reach people long thought to be unreachable. Television, radio, and the computer eliminate the formerly insurmountable barriers of time and place.

Furthermore, the ease with which modern communications technologies can link educational institutions to homes, work sites, and community centers has made adult education and lifelong learning matters of national policy. In some countries, governments now see ways to achieve egalitarian educational goals and provide opportunities to citizens denied access to traditional higher education by accident of birth. Other governments see in distance education structures inexpensive ways of supplementing the capacities of the traditional institutions. Still others see distance education as a way of increasing economic productivity by improving the skills and efficiency of the work force.

A Look at the Future

What distance education will be like 20 years from now is difficult--and risky--to predict. It does seem likely, however, that national general education projects in the traditional mold will be steadily deemphasized. For one thing, it is questionable that the supply of adult candidates for general and liberal studies will remain large enough in the developed nations to warrant the further replication of institutions like the BOU. It also seems probable that the newer telecommunications devices (such as personal computers, videodiscs, and videotex), with their interactive capabilities, will encourage more institutions to develop distance programs for discrete interest groups such as specialized vocational and occupational programs.

Finally, the interactive technologies that individualize instruction for the distance learner will undoubtedly encourage nonprofit institutions, proprietary institutions, and business and industry to concentrate on projects that teach specific job and occupational skills. As this study notes, more and more continuing professional education is being conducted at a distance via telecommunications.

It is even possible that, given the resistance of higher education institutions to change, the bulk of distance education in the future will be conducted under the auspices of business, industry, and the government. Not too long from now, there will be many jobs and skills that do not currently exist,

and job skills that are now common will no longer be needed. Technology-based distance education may very well provide the flexibility and adaptability needed to meet the challenge of future adult needs for job-related training.

GLOSSARY

Communications satellite--An "antenna in space" that receives, modifies, and retransmits radio signals to relay video, audio, or data to receiving stations on earth. A satellite stationed in geosynchronous orbit (22,300 miles above the equator) will remain "fixed" in position with respect to its receiving stations, allowing continuous communication. The important communication feature of the satellite is its transponder, or electronic package. Each of the satellite's 12-24 transponders is usually equated with a capacity of 1 television signal or 1,000 phone calls.

While a single satellite's coverage area, or footprint, can encompass up to one-third of the earth's surface, current technologies allow more targeted coverage of smaller areas when desired.

Decoder--A device used to unscramble a purposely scrambled or encrypted signal so that the signal can be clearly received. A decoder is often used by pay programming services to restrict reception to subscribers.

Distance education--Formal or nonformal instructional situations where learning takes place at sites removed from the point of origination and is characterized by varied degrees of access to the teacher, tutor, or peers. Today, instruction is often mediated by technology as well as by physical distance. "Distance teaching" and "distance learning" are sometimes used to differentiate between the instructional providers' and students' roles.

Electronic bulletin board--A feature of many electronic mail systems that allows network participants to "post" messages accessible to all members.

Fiber optics--A telecommunications system that transmits pulses of light through hair-thin glass or plastic fibers. A cable approximately three-fourths of an inch in diameter of such fibers can carry 40,000 phone calls.

Interactive cable--A form of cable TV that allows subscribers/viewers to send as well as receive information by means of a keypad or keyboard. Viewers may respond to questions posed by an instructor or program moderator, order products, participate in home security or medical emergency services, or subscribe to pay-per-view programming. Sometimes referred to as "viewer-response" cable. See also videotex.

Narrowcasting--Programming, usually video, transmitted to narrow target audiences with specialized interests (as opposed to a mass audience, broadcast approach). Although the term originated with cable television (the first technology to allow multiple channels for specialized programming), it now applies to other forms of electronic transmission. PBS's National.

Narrowcast Service, for example, plans to use ITFS frequencies to narrowcast professional development programming to work and other sites.

Slow scan/freeze frame TV--A process that transmits a video picture over telephone lines for display on a television monitor. Because the picture is "updated" only a few times every minute, portrayal of moving images is poor. Such a system transmits still pictures at a substantially lower cost than full motion video, however.

Some systems allow for transmission of a picture while another is being displayed, saving the time that would otherwise be used to "build" the image on screen.

Subcarrier--A portion of a television or FM radio signal on which a second signal (which may or may not be related to the main signal) has been placed, allowing the second signal to "piggyback" on the first. This allows for the transmission of a greater number of signals over a channel.

Teletext--A one-way technology that "piggybacks" computer-generated text and/or graphics onto a broadcast signal for receipt by television sets equipped with special decoders. The signal is carried in the vertical blanking interval.

Teletext may be displayed as "pages" of information called up by a handheld keypad, or as captioning superimposed on the television picture (as in closed captioning for the hearing impaired).

Vertical blanking interval--The "pause" between the horizontal and vertical segments of a video frame during the electronic scanning of a television signal. Textual and graphic data can be carried during the vertical blanking interval.

Videodisc--A plastic disc, similar in size and shape to a phonograph record, which is encoded with picture and sound for playback over a television set. The high capacity of the optical videodisc (40,000 still frames) and its capacity for nonlinear access via microcomputer (which allows rapid information retrieval, extensive branching, use of two distinct audio tracks, and similar manipulations) give it high potential as a tool for simulations and other educational uses.

Videotex--Most commonly used to refer to class of interactive technologies whereby textual and graphic information is called up from a centralized computer via keyboard or keypad for display on a television set or home computer terminal. The telecommunications connection may be by phone line or cable.

Some classification systems refer to such interactive systems as viewdata. The term videotext (spelled with the final "t") is then used to encompass both viewdata and teletext, a related technology in which the viewer chooses from a more limited range of information and does not interact with the central computer.

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